

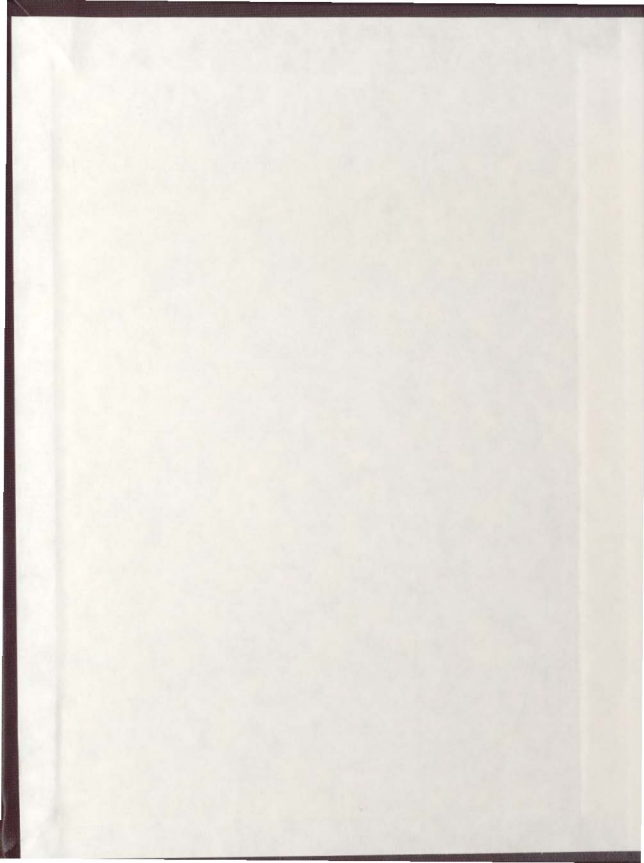
HEALTH MANPOWER PLANNING IN NEWFOUNDLAND

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HEALTH MANPOWER PLANNING IN NEWFOUNDLAND

by

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ABSTRACT

An increasing emphasis is being placed on health manpower planning both nationally and internationally as governments, employers, and professional associations jointly attempt to provide a better and more cost effective health care delivery system. This thesis (a) presents a synopsis of the major methodological approaches to estimating health manpower supply and requirements, (b) provides a summary of health manpower planning activities within the Province of Newfoundland, and (c) estimates the current and future supply and requirements for nursing manpower in Newfoundland over a five-year planning time frame.

The findings of the research with regards to the provincial nurse manpower situation are that current supply meets current requirements and that projected supply would exceed projected demand given the methodological approaches to supply and requirements that are utilized in the thesis. While the findings also suggest that there may be a surplus of nurses at the end of the planning time frame, the author is not prepared to state definitely that such will be the case due to the changing labour force participation rates of women and the trend towards part-time employment by nurses. The author stresses also in this regard that the supply and requirements estimates derived in any study are, in large part, determined by the planning methodology chosen.

The major conclusions to be drawn from the thesis are (a) while several formal approaches to health manpower planning exist, not all of them will be applicable in all settings due to factors such as the non-availability of data and limited financial, time and human resources; (b) health manpower planning is a very imprecise and hazard prone activity; and (c) there is a need for increased flexibility in health manpower policy and decision making. The thesis concludes with the caution that mechanistic techniques are not a substitute for insight and the recommendation that the use of expert opinion and professional judgement continue to be incorporated with any future manpower planning activities that take place within the Province.

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LIST OF ABBREVIATIONS

ARNN	- Association of Registered Nurses of Newfoundland
FTE	- Full Time Equivalent
NHA	- Newfoundland Hospital Association
USDHEW	- United States Department of Health, Education and Welfare
H & W Canada	- Health and Welfare Canada

1.0 INTRODUCTION

1.1 Objective

Health manpower planning has been defined as -

a process whereby goals, objectives, priorities, and activities for health manpower development are determined in a systematic fashion, in order to ensure that health resources, both current and future, are adequate to meet the requirements for the delivery of health services to a population. (USDHEW [HRA] 76-14013, 1976, p.3)

Most modern societies are placing an increasing emphasis on health manpower planning as part of their efforts to develop, within reasonable expenditures, "a more accessible, more equitable and more effective health care delivery system." (Hall & Mejia, 1978, p.5) Since the health industry is labor intensive and the major portion of health expenditures is allocated to manpower, there is a great need for close coordination between the growth and development of the health care delivery system and the planning, production and maintenance of health care workers.

This thesis will focus on health manpower planning activities in the Province of Newfoundland. The main objectives of the research are to:

- (1) explore and summarize the major methodological approaches to estimating health manpower supply and requirements;
- (2) summarize the major health manpower planning activities in the Province to date; and
- (3) determine current and future supply and demand of one of the health professional groups in the Province using the most appropriate planning strategies.

1.2 Scope and limitations

The information presented in Section 2.0 regarding manpower planning strategies was prepared after a search of the relevant literature from international sources. The material discussed in the other sections is provincial in scope. Section 3.0 refers only to manpower planning activities within the province and does not describe national initiatives in this area, other than through provincial membership on federal/provincial committees. The registered nurse supply and demand estimates and projections outlined in Section 4.0 are limited to an examination of the nursing situation in the province's hospitals, nursing homes, nursing stations and the community health field. Peripheral reference is made to the nursing situation and related issues in other provinces or countries. Additional limitations relating to the nursing data are described in Section 4.1. Limitations due to data inaccuracies and deficiencies are presented in Sections 1.3 and 1.4.

The application of the various planning strategies to only one professional group limits the conclusion that can be drawn about the different planning techniques. The efficiency of the various approaches would be likely to vary from group to group due to the different employment patterns, such as employed individuals as opposed to independent practitioners, and the size of the occupational populations.

Recommendations for further research in this area are presented in Section 5.2.

1.3 Problems in data gathering

The compilation of statistics is a basic element in manpower planning activities. Without an adequate data base, manpower planning estimates and projections would be inadequate and inaccurate, and costly errors could be made in such matters as the numbers and types of training programs that are established.

Some of the numerous problems inherent in the collection of manpower statistics are outlined below:

- (a) required statistics are frequently missing or incomplete;
- (b) data available from different sources are often inconsistent or non-comparable over time; and
- (c) certain types of data sources may inadvertently provide misleading information. An example would be using the total number of registrants with a professional association to indicate current supply when registration with the association is not compulsory for practice.

Major problems in the collection of data also occur due to differing opinions as to the nature of the data to be collected and the most appropriate data gathering techniques. Head counts of discrete occupations are misleading for a variety of reasons including the fact that such counts ignore practitioners who are employed but not credentialed. Obtaining meaningful counts is further complicated by the

opportunities for, and occurrences of, complementarity (an example is the functioning of the operating room team), substitutability (illustrated by the use of physicians' assistants), and team approaches to health care. Selection of an appropriate method for the collection of data and the projection of manpower estimates is complicated by the facts that consensus does not exist as to the best approach and that whatever approach is chosen is conditioned by the human and financial resources and level of technical expertise available.

The final factor to be mentioned concerning data gathering techniques is the need for reliance on secondary data sources and proxy measures. Due to fiscal and time constraints, these sources should be utilized whenever possible and only in cases where these sources will not provide usable answers should the collection of data from primary sources be conducted. Care must be taken, however, in the use of secondary sources for estimating current supply since using certain types of information - e.g., the number of licensed individuals, will not account for factors such as personnel working part-time and the holding of a licence by persons with no intent to practise. Also, using different sources may give inconsistent time frames, varying definitions and concepts, and possibly non-comparable data. All these factors must be identified and taken into account wherever secondary data sources are used.

1.4 Accounting for the unpredictable

Predicting the future is very hazardous. A working party on Postgraduate Medical Education in England recently concluded that -

the main barriers to [effective manpower planning] are that neither individual employers nor private investigators can foresee with any clarity the implications for demand of new scientific developments or changes in economic and social circumstances, nor can an approach based on manpower needs take account of such factors as the transferability of skills between subject disciplines. (Swinerton-Dyer, 1982)

In addition, the effects of changes in various local or national policies and programs could have a major impact on both the demand for and the supply of health manpower. Factors such as labor force participation rates of women, increased productivity, transfer of functions, and the like, all will profoundly affect future manpower supply and requirements, but the degree to which this will occur is very difficult to predict. Where possible, however, changes likely to occur must be accounted for in advance to prevent their distorting the projections being made.

There are numerous other variables which will undoubtedly have an impact on manpower requirements and costs. The effects of changes in these variables are also difficult to quantify. These variables include technological innovations, new modes of health care delivery, quality of health care, preventive versus curative health services, accessibility of health care, method of remuneration, public as

opposed to private sector financing of health care, immigration levels, expansion or reduction in health education and health care facilities, major industrial reduction or expansion, and political decision making. As suggested, the anticipated effects of any known changes in these variables should be incorporated into any manpower plans that are developed. Undoubtedly, however, unanticipated changes will also occur over the planning period. Revisions in targets, projections and plans will then have to be made, taking these developments into account.

1.5 Definition of terms

Before proceeding further, definitions of most of the major terms and concepts utilized in the report will be provided. The prime purpose in doing this is to ensure that the reader has readily available an easy reference source for those terms with which he/she is not fully conversant. Also, since many of the terms used have more than one definition or application, it is important that the reader be aware of the sense in which the terms are being used in this report. For the sake of convenience, the definitions are presented in alphabetical order:

Active Nursing Status: Refers to a nurse who holds an active licence and is, therefore, employed in nursing within the Province on either a full-time, part-time, or casual basis.

Annual Disability Days: Includes bed-days, major activity-loss days, and days when activity had to be curtailed for all or most of a day as a result of short term disability associated with episodes of illness or injury. (Government of Canada, 1982)

Cohort: A group of persons who have experienced an event during a common period. Example: The cohort of 1980 nursing graduates includes all nurses who graduated in that year.

The Delphi Method: A methodological approach, developed by the Rand Corporation, which utilizes the opinions of a panel of experts to make predictions about the future. In this approach, the experts provide their opinions through a structured program of mail interviews, and at no time do they meet each other. There are several rounds of questionnaires (three at a minimum) with each round being followed by feedback on the views of the other experts in the panel. Subsequent to this feedback, each expert is expected to either alter his/her views to come closer to the opinions of the panel or to explain why his/her views are so divergent.

Disposable Income: Refers to what remains of personal income after taxes and other mandatory deductions have been made.

Effective Health Care Demand: The willingness and ability of consumers or the community to pay directly or indirectly for health services.

Equivalency Test: Tests administered to persons interested in obtaining credentials in a particular profession who have acquired their working knowledge on the job or through other non-academic routes or in other countries or political subdivisions. Such exams enable the individual to challenge course requirements and, upon successful completion, to receive advanced standing.

Established Positions: Refers to all the positions in a particular health occupation that employers are attempting to fill with qualified staff.

Full-Time Equivalent (F.T.E.): A full-time equivalent is defined as the period of time required to make up a normal working week for one full-time position. For example, a registered nurse working full-time represents 1.0 full-time equivalent. Five nurses working one shift each per week would also represent 1.0 full-time equivalent since each would be working $1/5$ (0.2 F.T.E.) the time of a full-time person, based on a five-day work week.

Health Manpower: In the broadest sense, refers to all persons in the health care industry engaged in any capacity in activities devoted to providing health care. In the context of this report, the term refers to (1) those health care workers already employed in the health system in their

field of educational preparation; (2) inactive health care workers - i.e., those who have the necessary training or experience to work in a particular health occupation but who are not employed at the present time; and (3) prospective health care workers - i.e., those individuals who are currently undergoing education and training to prepare themselves for employment in the health care system.

Inactive Nursing Status: Refers to a nurse who is qualified to practise nursing but who is not currently practising. Such nurses do not necessarily maintain an active licence, and, depending on the number of years out of practice, may or may not have to complete a refresher program before returning to active employment.

Income Elasticity of Health Expenditure: The percentage change in the consumption of health services relative to the percentage change in either the income potentially available to spend on health services or in the cost of health services. An income elasticity of 0.5 would mean that, for a 10% rise in income, expenditure on health services would rise by 5%.

Labor Force Separation Table: An age-specific estimate, by occupation, of the national annual rate of employment separations due to death and retirements combined. The United States Bureau of Statistics has prepared separation

rates for over 400 occupations by state. Such computations have not been made for Canada as yet.

Lapsed Nursing Membership: Refers to nurses who are qualified to nurse but who are inactive and have failed to maintain membership with the professional nursing association.

Life Table: Tabular presentation of estimates, based on census population data and national death statistics, of the annual mortality rate of the population stratified by sex, single years, and age groups. In certain areas, these rates are further analyzed and applied to various occupational groups including the major health occupations.

Methods: Used interchangeably with the term "approaches" to represent formal manpower planning estimation/projection techniques.

Primary Source of Information: Refers to the collection of information directly from health professionals or health care providers including employers. Such information would be obtained through surveys conducted by mail, telephone, personal interview, etc.

Proficiency Examinations: Examinations which enable individuals, who have acquired working knowledge in a profession through non-traditional routes, to demonstrate their ability to do the work and thereby receive the appropriate credentials.

Proxy Measures: Refers to the substitution of a set of "comparable" data for more current or precise data that are unavailable for a local survey or study. Proxy measures may be specific to geographic, time, and subject matters.

Examples:

Geographic - Using national statistics on health care utilization patterns, labor force separation rates or mortality rates to represent the provincial situation.

Time - Using the most recent available figures instead of current figures.

Subject Matter - Using the total female labor force participation rates to calculate the labor force participation rates of nurses.

The use of such data is based on assumptions that the populations of the two areas are comparable and that the statistics used in time proxy measures will remain constant over time.

Relevant Labor Market: Generally, labor markets are local and refer to areas within which workers can commute to work and can change jobs without changing residence. For certain professions, and at particular times, however, the relevant labor markets are wider and may be regional or national in scope - e.g., for physicians just completing their specialty training program.

Secondary Source of Information: Refers to the borrowing of data already collected by other agencies and the utilization of proxy measures. Sources of secondary data include professional associations, trade unions, licensure boards, federal and provincial labor and health statistical reports, census data, educational institutions, and telephone directories.

Shortage: Refers to a manpower imbalance in which "supply" is less than "demand". Note should be made that some reported "shortages" may be artificial on the basis of either demand being too broadly defined and, for example, including manpower requirements in excess of the financial resources available to pay for them, or supply being too narrowly defined and thereby excluding some qualified people, such as the unemployed, who might be available for employment if the circumstances were right.

2.0 MANPOWER PLANNING STRATEGIES

2.1 The planning environment

This section will present material on the factors affecting the supply of and the demand for health manpower, and will provide a description of the various methodological approaches available for use in estimating health manpower supply and requirements.

Before proceeding with this material, however, note should be made of the importance of involving both the providers and the consumers of health care in any planning activities that will form the base for manpower policy decision-making. Organizations from the education sector, the professional sector, the provider and financing sector, and the planning and regulatory sector, all have planning and implementation responsibilities in health manpower development and must be closely involved in the planning process if the resultant plans are to have any chance of success.

(USDHEW [HRA], 76-14013, 1976, p.6) Whenever the implementation of health manpower plans will require political decision making, such plans should be developed on the basis of the prevailing policies and legislation while taking into consideration the policies, resources, and constraints of the health and related sectors.

2.2 Balance of resources

Hall and Mejia (1978), in describing the process of health manpower planning, refer to the need for a balance

between current and future health manpower resources and the requirements for delivering health services to a population (p.29). To achieve such a balance of resources, four key factors - i.e., manpower supply, manpower distribution, manpower utilization, and manpower productivity, must remain in equilibrium. (USDHEW [HRA]-76-14013, 1976, pp.4-6) These factors and a variety of strategies for handling common problems, particularly deficiencies, often associated with each of them, are outlined below:

Factor: MANPOWER SUPPLY

- Strategies:
- (a) develop appropriate mix of health personnel and skills through the education process
 - (b) create new education or training programs
 - (c) terminate or reorientate existing education or training programs
 - (d) devise strategies to attract students into current, new, or revamped training programs
 - (e) entice needed personnel from out of province
 - (f) reactivate inactive personnel
 - (g) campaign for removal or modification of licensure or other legal barriers to professionals entering practice in the locality

Factor: MANPOWER DISTRIBUTION (geographic and specialty)

- Strategies:
- (a) develop incentives to attract available professionals to manpower deficient areas - e.g., guaranteed incomes, settlement grants, isolation allowances, bonuses for extended service

- (b) locate training programs in undersupplied areas
- (c) utilize mobile health units, or the telecommunication system, to bring the services of health professionals to the underserved areas
- (d) supply transportation of patients to providers
- (e) improve utilization/productivity of existing personnel
- (f) substitute more readily available lower cost health workers (in keeping with safe medical practice) where possible

Factor: MANPOWER UTILIZATION

- Strategies:
- (a) redefine job descriptions
 - (b) transfer functions to less costly personnel
 - (c) assess technology of health care delivery - substitute equipment for additional personnel
 - (d) reevaluate staffing patterns in various settings
 - (e) consider substitutability of manpower - e.g., physicians' assistants
 - (f) utilize complementarity and the team approach to medical care
 - (g) remove barriers to practice through proficiency examinations and equivalency tests

Factor: MANPOWER PRODUCTIVITY

- Strategies:
- (a) to (e) as described under manpower utilization
 - (f) listen to the concerns of staff members and work with them in providing satisfactory working conditions and reducing restrictive personnel policies

- (g) provide feedback and positive reinforcement
- (h) offer rotation, advancement, continuing education programs, career ladders, and job security
- (i) attempt to change credentialing practices that deter task delegations due to legal limitations on scope of practice
- (j) lobby for equivalency tests and proficiency examinations to lower credentialing barriers
- (k) increase the use of auxiliary personnel
- (l) utilize new technological advances and modes of delivery
- (m) reduce absenteeism to an acceptable level

2.3 Determinants of manpower demand and supply

2.3.1 Determinants of demand

The two main determinants of the effective demand for health manpower are the amount and level of health services demanded and the level of productivity of the health manpower resources available. The quantity and quality of health services demanded are determined by factors such as health care technology, the demography of the population served, the health status of the population, the public's awareness of and the value it places on health care, the supply, accessibility, and efficiency of the health services offered, and the financial resources available to pay for such services. Health manpower productivity is closely tied to the current level of medical technology and the nature of

health care delivery system in effect in a given area.

The various determinants of health services, and, therefore, health manpower demand, affect different occupations in different ways. For example, the demand for physicians is conditioned primarily by the size and distribution of the population, while the demand for laboratory technologists is based mainly on the availability and the level of development of biomedical equipment and technology.

2.3.2 Determinants of supply

The main factors determining the supply of health manpower include anticipated salary levels and prestige in relation to time and cost of training, opportunities for training and the likelihood of employment in the chosen field, working conditions, geographic and occupational mobility, labor force participation rates, rates of deaths and retirements, social and cultural aspects of community life, institutional and legal constraints to employment, and financial and other incentives to practise in a given area.

As with the determinants of demand, the various factors affecting supply impact on each occupational group differently. For physicians, the major long range constraint would be the capacity of medical schools, and the only real short-run solution to undersupply would be adjustment of the levels of recruitment of foreign medical graduates.

- Recruitment of foreign nurses has often played a large part in resolving nursing shortages as well. However, a more ready and realistic source of supply could be the pool of inactive nurses who might be enticed back to the workforce if the appropriate incentives were offered.

Another key factor for consideration in relation to the supply of health professionals is the relevant labor market. Generally, the more highly trained professionals would be considered to have a wider relevant labor market and a higher degree of geographic mobility than those with lesser periods and levels of training. This reflects the desire of most of these individuals to have access to well-equipped and well-staffed clinics and hospitals where they can pursue their practice specialties in an atmosphere conducive to their professional and cultural growth and development.

2.3.3 Interaction of supply and demand

The interaction of supply and demand can also have a major impact on health services manpower. For example, in areas where there is an oversupply of physicians, physicians may be underutilized and find themselves performing health care tasks that could easily be delegated to allied health personnel with lesser levels of training and cost. When shortages occur, the reverse takes place. Tasks are then delegated from the shortage group to a more plentiful

manpower category. It was a situation such as this that led to the development of the nursing assistant category. As that experience shows, some changes, while originally made as adaptations to immediate supply-demand problems, often become permanent additions to the health manpower field.

2.4 Methodological approaches to estimating supply

It should be noted from the outset that supply is not a static element in the labor market. Rather, it is clearly responsive to financial and other incentives and, in the long run, will fluctuate according to various factors such as availability and cost of training, levels of remuneration, licensure requirements, labor force participation rates, and occupational and geographic mobility. The more responsive supply is to these various factors, the greater supply elasticity is said to be.

Hall and Mejia (1978) suggest that supply analysis has three main components: current supply, future increments and projected losses. Current supply comprises those individuals presently employed in a particular health occupation. It fluctuates constantly due to various inflows and outflows. The inflows or increments are made up of new graduates (trained locally or abroad), transfers from other occupations, and the immigration of previously trained

health personnel from abroad. The outflows or losses are due to deaths, retirements, emigration, and transfers to other occupations. (pp. 91-92)

In addition to these main components, there is also movement into the active supply by individuals who had previously been inactive and vice versa. The inactive group - i.e., qualified persons potentially able to serve in health occupations who are either retired or engaged in other activities are really a reserve force that could provide a quick low cost solution to certain supply problems provided that planners could identify and respond to the personal and professional characteristics and threshold conditions that would entice these individuals to return to the labor force. (pp. 91-92)

Robert Nathan Associates, Inc. (USDHEW [HRA] 76-14511, 1976) takes the definition of current supply one step further by adding those individuals who are actively seeking employment in a particular occupation. They also differentiate between current active supply - those employed plus those seeking employment, and current potential supply - current active supply plus the pool of qualified inactive personnel. (p. 49)

2.4.1 Current supply

Measurement of current supply is performed for two main reasons:

(1) to assess the current situation and develop plans to correct any imbalances that might exist such as manpower shortages, surpluses, maldistribution, or malutilization; and

(2) as a basis for long range planning to ensure that future supply will be sufficient to meet the anticipated demand for health care.

There are two formal data collection techniques, the Employer Survey and the Licensure Survey, available for use in the collection of current supply data (USDHEW [HRA] 76-14512, 1976, pp.94-106). Both techniques relate to the collection of data from primary sources and should only be used when secondary sources or proxy measures cannot provide usable data. The chief characteristics of each of these methods are outlined in Tables 1 and 2.

Attitude and opinion surveys can be conducted on a census or sample of health workers to elicit reactions to current or proposed policies on manpower issues such as manpower redistribution, the introduction of a new kind of health care worker or the transfer of functions from one health occupation to another. However, while such surveys

TABLE 1 - DESCRIPTION OF AN EMPLOYER SURVEY AS
A METHOD FOR ESTIMATING CURRENT SUPPLY

Description

- A survey (census or sample) of employers undertaken to obtain an occupational profile of the employment setting.

Data Requirements

- Current employment in each selected occupation in terms of full time equivalent personnel.

Examples of Use

- Determination of current manpower situation.
- Assessment of imbalances between current supply and requirements - helps identify where main problems, and possibly key solutions, may lie.

Strengths

- Additional information could be gathered easily - e.g., rates of turnover, lengths of time jobs are vacant, projected requirements.
- Amasses a lot of pertinent information at low cost to the planner.
- Utilizes reliable source of information.
- Does not require a great deal of technical expertise.

Weaknesses

- Difficult to develop sampling frame to represent the universe.
- Sampling and response error are inevitable and difficult or impossible to correct.
- Excludes those seeking employment. In practice, these numbers are very small and difficult to measure and are often legitimately ignored by planners.

References

USDHEW, (HRA) 76-14512, 1976, pp. 94-97

TABLE 2 - DESCRIPTION OF A LICENSURE SURVEY AS A
METHOD FOR ESTIMATING CURRENT SUPPLY

Description

- A survey (census or sample) of health professionals applying for a licence to practise, or its renewal.

Data Requirements

- Demographic characteristics, educational and training background, current and past employment history, geographic location and mobility.

Examples of Use

- Identification of potential supply (through inactive licence renewal).
- Clarification of certain supply and demand problems - e.g., artificial constraints to practice.

Strengths

- Licensing boards provide sampling frame.
- Mailing costs reduced if done in conjunction with licensure application/renewal forms.
- Some socio-economic data may be obtained as by-product.

Weaknesses

- Assumes head count may be used as a proper measure of potential supply.
- Excludes inactives who do not maintain a current licence.
- Does not account for personnel working part time.
- Assumes implicitly that only licensed personnel are performing the functions designated by law in the professional scope of practice - not always the case.
- Can only be used for those occupations with mandatory licensure for practice.

References

- USDHEW, (HRA), 76-14512, 1976, pp. 97-106

may be useful as an accompaniment to other sources of information on health manpower, they do not provide specific supply information and are of marginal utility given the costs of conducting them.

2.4.2 Future supply

Methodological approaches to estimating future supply use current supply as the base and estimate the movement of personnel into and out of the current active supply during the projection period. To measure the various increments and losses, proxy data and material from secondary sources usually are manipulated and analyzed by various statistical methods.

Generally, the components of each element affecting future supply would be projected separately and the estimates aggregated to obtain the total supply projection. However, in many cases, very little reliable information is available regarding some of the factors such as geographic and occupational mobility. The planner must, therefore, either employ an assumption based on the information available or utilize a projection methodology which can circumvent this data deficiency (see Trend Analysis, p.35). In projecting future supply, assumptions must also be made regarding major events or policy changes that are likely to occur during the projection period and their impact on the projected increments

and losses. Where possible, particularly in relation to projected changes in growth rates, these assumptions must be based on statistical evidence or sound logic.

Increments

The main sources of increments to current supply will arise from the production of new graduates, occupational and geographic transference, and reentrance to the labor force of inactive personnel. Hall and Mejia (1978), in discussing future increments, suggest that three main questions need answering:

- (1) Given the existing or the planned educational capacity, how many new graduates or trainees will be produced in future years?
- (2) What internal factors ... could be modified so as to improve the quantitative or qualitative output of training institutions, and what are the maximum enrollments possible in those institutions, if it becomes necessary to increase the manpower supply?
- (3) What external factors limit current school enrollments and effective output?(pp.107-8)

The types of information needed to answer these questions include student enrollment by year of study by sex; applicants (total, and those with minimum acceptable qualifications) for admission; student attrition rates; the number of faculty positions budgeted, filled and desirable, in full-time equivalents; costs of training per student or graduate per year; an assessment of teaching facilities in

light of (a) present and projected enrollments and (b) special constraints on expansion; proposed curricular changes if they would impact on admission requirements, length of training, etc.; potential expansion of school capacity; and the rate of influx of foreign graduates.

Once all these data have been accumulated, the planner can then proceed with making supply projections relative to (a) the number of persons likely to be qualified to work in a particular occupation at some point in the future; (b) the number of such persons likely to be employed in the health sector given the current and projected demand; and (c) the extent to which supply can be increased with and without creating new educational institutions.

Kriesberg et al. (USDHEW [HRA] 76-14512; 1976) present two explicit approaches for estimating future increments (pp. 108-118). These methods - An Inventory of Educational Institutions: A Method of Estimating Inflows of New Graduates, and A Method of Estimating Inflows of New Licentiatés: Net Additions to the Stock of Supply - are expected to stand on their own as projection methodologies. They would collect much the same information as Hall and Mejia's approach, but the amount of data collection would not be as extensive. The main characteristics of both these methods are outlined in Tables 3 and 4.

TABLE 3 - DESCRIPTION OF AN INVENTORY OF EDUCATIONAL
INSTITUTIONS AS A METHOD FOR ESTIMATING
INFLOWS OF NEW GRADUATES

Description

- Secondary information is used or an inventory of educational institutions is conducted by mail or personal interview to determine the projected output of health education programs.

Data Requirements

- Number of programs, levels of enrollment, capacity of programs, number of graduates, plans for change in any of the foregoing or the addition of new programs.

Assumptions

- That the output of institutions in the planning area represents the total addition of new graduates to supply.
- That the in-migration of new graduates trained elsewhere will balance the out-migration of local graduates.

Strengths

- Utilizes reliable source of information.
- Additional information could be gathered easily.

Weaknesses

- Hard to predict accurately policy changes, especially related to Government funding, that will occur.
- Overlooks alternate routes to qualification - e.g., on-the-job training and challenge/proficiency exams.
- Excludes new educational institutions by definition.
- Fails to account adequately for the retention rate of new graduates in the area.
- Does not account for foreign graduates, transfers from other occupations, or the re-entrance of inactive personnel as sources of increments to supply.

References

USDHEW, (HRA) 76-14512, 1976, pp. 108-113.

TABLE 4 - DESCRIPTION OF THE COMPUTATION OF NEW
LICENTIATES AS A METHOD FOR ESTIMATING
INFLOWS TO SUPPLY

Description

- Uses the number of new licences issued annually as a net figure of additions to supply. Projection of future inflows can be made by trend analysis or applying the average annual rate of change of the historical data on new licentiates.

Data Requirements

- Number of new licences, covering initial provincial licensure based on examinations, endorsements or reciprocity, but excluding renewals and grandfather clauses, for as many years as possible.

Assumptions

- That historical trend is a reliable basis for such projections.
- That non-licensed personnel are non-existing or not an important element in the supply situation.
- That head counts of discrete occupations are meaningful.

Strengths

- Additional information could be gathered easily.
- An adjustment for geographic and occupational mobility is built in (already made by person applying for a licence).
- Accounts for retention rate of new graduates in the area.

Weaknesses

- Includes some holders of licences who do not intend to practise, or who practise part time.
- May underestimate supply - overlooks fact that non-licensed people may be performing some tasks limited by law to licensed professionals, and ignores re-entrance of inactive personnel to work force.

References

- USDHEW, (HRA), 76-14512, 1976, pp. 113-118

Losses

In estimating future supply, planners must account for losses from both the current supply and the estimates of increments due to new graduates. The four main sources of loss are retirements (temporary or permanent), deaths, and both occupational and geographic transference. Their relative importance and impact varies from time to time and from occupation to occupation depending upon several factors such as the age and sex of the group under study, levels of remuneration, the nature of the health system, the general economic situation of a province or country, and the country's level of development.

While data deficiencies and limitations make it difficult to predict manpower losses with a great degree of certainty, particularly in relation to geographic and occupational mobility, there are four standard methods which can be used for this purpose: the Life Tables Method, the Labor Force Separation Rates Method, the Cohort Method, and Approximations. The main features of each of these methods are outlined in Tables 5, 6, 7 and 8.

It should be noted that none of the methods accounts for persons working beyond the presumed retirement age. This factor can be dealt with by either using a certain fixed percentage or by completely eliminating them from the measurement of actively employed individuals. Studies

TABLE 5 - DESCRIPTION OF THE LIFE TABLES METHOD
OF ESTIMATING SUPPLY LOSSES

Description

- Mortality rates by age group (as obtained from life tables) are applied to the number of health professionals in those age groups to estimate the loss to supply caused by death.

Data Requirements

- Age distribution of the health group under study for the base year.
- Life tables (national, provincial, or occupational).

Assumptions

- That the life tables used are appropriate for the projection period and for the group under study.

Strengths

- Availability of national and provincial life tables based on census and death statistics.

Weaknesses

- Age distribution by occupation is difficult to obtain.
- National or provincial vital statistics may not accurately represent a particular health occupation.
- Significant changes could occur during the projection period to alter longevity - e.g. , war.

References

USDHEW, (HRA) 76-14512, 1976, pp. 118-121

TABLE 6

DESCRIPTION OF THE LABOR FORCE SEPARATION
RATES METHOD OF ESTIMATING SUPPLY LOSSES

Description

- Supply losses attributable to deaths and retirements combined are calculated by applying age specific labor force separation rates (as obtained from labor force separation tables) to the health professional group under study.

Data Requirements

- Total base year active supply and age distribution of the group under study.
- Labor force separation tables (not available for Canada).

Assumptions

- That local pattern of working life and age distribution is comparable to the national/state pattern.

Strengths

- Availability of published separation tables in certain countries.

Weaknesses

- Lack of working life tables by occupations.
- Lack of working life tables in certain countries.
- Application of same separation rates to different occupations assumes mortality and retirement do not differ by occupation.
- Assumes marital status and number of children have same effect on all women regardless of occupation.

References

USDHEW (HRA) 76-14512, 1976, pp. 121-128

TABLE 7 - DESCRIPTION OF THE COHORT METHOD OF
ESTIMATING SUPPLY LOSSES

Description

- Losses from all sources are calculated simultaneously by comparing cohorts of past graduates or licentiates with the number in each cohort who are professionally active at a current or more recent time. These loss rates are then applied to each cohort of professionals active in the base year of a manpower study to estimate the number likely to be active in future years.

Data Requirements

- Number in each past and current cohort of graduates or licentiates.

Assumptions

- That factors affecting losses will not change.

Strengths

- *- Accounts for all sources of losses.

Weaknesses

- Assumption that factors affecting losses will continue unchanged.

References

Hall & Mejia, 1978, pp. 104-105

TABLE 8 - DESCRIPTION OF THE APPROXIMATIONS
METHOD OF ESTIMATING SUPPLY LOSSES

Description

- Approximations of losses from all sources combined are made by applying an annual loss rate of approximately 2.0 - 2.5% for males , and 2.4 - 2.5% for females, assuming a young average age.

Data Requirements

- Current supply, length of projection period.

Assumptions

- That these approximations are reasonable for developed countries. Note: A loss rate of 1.0 - 1.6% is considered reasonable for predominantly male professions in developing countries if emigration and job transfers are not problems.

Strengths

- Provides a quick estimate in the absence of more refined data.

Weaknesses

- Very simplistic.
- Assumes factors affecting losses will continue unchanged.

References

Hall & Mejia, 1978, pp. 105-106

undertaken elsewhere, however, suggest that the average retirement age may change rapidly over time and should, therefore, be monitored closely. Hall and Mejia (1978) quote results of a French study which showed that the percentage of French physicians remaining active beyond the age of 65 dropped from 57.0% to 46.1% over the 11-year period from 1956 to 1967. This decrease was presumed to represent improving economic conditions and earlier retirement (p.106).

Trend analysis of annual supply

In cases where sufficient data are not available regarding increments and losses, trend analysis of annual supply can be performed to obtain a net estimate of changes in the supply stock. Using the historical pattern of change between one year's supply and the next to represent the change likely to occur in the future, this method circumvents the need to measure increment and loss components separately. Details of this approach are outlined in Table 9.

2.4.3 Strengths and Weaknesses of Supply Methodologies

In summary, the main methodological approaches for estimating current supply are the employer and licensure surveys. Attitude and opinion surveys can also be conducted but are of questionable value given the cost of conducting them and the limited data they provide.

TABLE 9

DESCRIPTION OF TREND ANALYSIS
AS A METHOD FOR ESTIMATING
NET CHANGES IN SUPPLY STOCK

Description

- Calculates a historical pattern of the differences between one year's supply and the next and uses this difference to represent the effect of all factors operating to increase or decrease supply stock.

Data Requirements

- The historical record of active supply of professional group under study for as long a period as possible.

Assumptions

- That the difference between increments and losses in the future will continue to follow the historical pattern.

Strengths

- Circumvents need to measure increment and loss components separately.
- A relatively simple method of estimating net changes to supply stock in cases where sufficient data are not available.

Weaknesses

- Underlying assumption may be wrong and lead to false estimates since the past is not necessarily a good indicator of the future.

References

USDHEW (HRA) 76-14512, 1976, pp. 128-132

The main approaches to estimating future supply relate directly to the two main components of future supply and can be categorized as follows:

<u>COMPONENT</u>	<u>METHODOLOGICAL APPROACH</u>
Increments	(a) Inventory of Educational Institutions (b) Computation of New Licentiatees
Losses	(a) Life Tables Method (b) Labor Force Separation Rates Method (c) Cohort Method (d) Approximations

Trend analysis of data allows for the estimation of changes to the supply stock in cases where insufficient data on increments and losses are available.

All of the supply methodologies have inherent strengths and weaknesses which relate mainly to the availability, validity and comprehensiveness of the data, and the analytical techniques used. None of the methods is sufficient unto itself since each one provides information about only certain aspects of the supply situation. Once the increment and loss components have been estimated separately, the data must then be aggregated to obtain the total supply picture. Trend analysis is the only approach that can estimate future supply while accounting for all the relevant variables, including occupational and geographic transference.

The main common strength of the supply methodologies is that data are generally available for the major increment and loss components, and those components for which information is missing or insufficient are usually small enough not to affect the final estimates. For example, current supply measures frequently ignore the unemployed, and future supply measures often disregard occupational mobility.

The major weaknesses associated with the supply methodologies are that

- (a) data are not equally available for all health professions;
- (b) data on some components of future supply are easier to document than others, with occupational and geographic transference being the factors most difficult to predict;
- (c) utilizing a head count as a measure of current supply overlooks the importance of the mix and productivity of manpower and the quantity of services provided; and
- (d) these methods estimate supply independently of the effective demand for health manpower.

The planner, in utilizing supply methodologies, must evaluate the quality of the methods being used, adjust the estimates as well as possible, and present the final projections with a full awareness of the inherent strengths and weaknesses of the estimating process.

2.5 Methodological approaches to estimating requirements

2.5.1 Current and future requirements

The same methodological approaches are used to project both current and future manpower requirements. It is the time frame, not the method, which distinguishes them.

A variety of methodological approaches for estimating future manpower requirements exist. In industry, these approaches range from simple forecasts by a small employer of the need for one or two workers to highly sophisticated plans encompassing mathematical models using regression analysis, linear programming, and simulation methodologies. The nature of the health care delivery system has necessitated the development of requirement approaches that are specific to the health field. While some of the highly technical approaches referred to above could have application in the health sector, they are rarely used for local manpower planning activities, given the high level of resources required in terms of finances, highly trained personnel, and computer facilities.

The major methodological approaches for estimating health manpower requirements are as follows:

- Methods Based on Professionally Defined Standards
 - (a) Health Needs Approach
 - (b) Service Targets Approach

- Manpower/Population Ratio Approach

- Health Demands Approach

- Method Based on Evidence in Comprehensive Prepaid Group Plans

Each of these methods will be described in some detail below.

Methods Based on Professionally Defined Standards

The professional judgement of experts is elicited very frequently in the study of health manpower requirements. It may serve as the sole basis on which requirements are estimated, or it may be an explicit element in a methodology which employs empirical data as well.

Virtually all studies of supply and requirements use expert opinion at some point. Professional judgement is utilized in the following ways: (a) in the Manpower/Population Ratio Method to determine the appropriate ratio of manpower to population; (b) in the Health Needs Approach to determine the level of health care necessary for the population to attain and maintain "good health"; (c) in the Service Targets Method to set the targets of the types and quantities of services required by the population and to determine measures of manpower staffing and productivity; and (4) in the Health Demands Method to estimate utilization and

productivity rates for various services in different settings. Also, since assumptions about the future have a major impact on the validity of projections, the assistance of experts is usually sought in formulating such assumptions.

Several methods are available for eliciting the opinions of experts. One method brings experts together to discuss the matter under consideration; e.g., health needs, and to reach consensus on which projections for manpower requirements are then based. Another approach, known as the Delphi Method, obtains the opinions of a panel of experts through a series of mail interviews. At no time are the panelists brought together.

There are certain inherent weaknesses associated with utilizing the opinions of experts, however. First of all, it may be difficult to reach a consensus on the matter under consideration. Secondly, biases may be introduced through the possible tendency of experts to overestimate either the need for services in their field or the extent to which practice patterns may change. In addition, there may be a disinclination on the part of professionals to consider other options such as task delegation and the use of auxiliary personnel which might be more cost effective.

Tables 10 and 11 provide a description of the two major projection methodologies which utilize professionally

TABLE 11 - DESCRIPTION OF THE SERVICE TARGETS
APPROACH TO ESTIMATING REQUIREMENTS

Description

- Focuses on the services produced by health personnel and the volume of services to be provided to health care consumers as the main determinants of manpower requirements.

Methodology

- (1) Professional opinion/utilization data are used to set targets of types and quantify of services required by planning population.
- (2) Task analysis is performed to determine amount of time a typical practitioner would need to provide each service.
- (3) Manpower requirements are derived by applying manpower staffing and productivity standards.

Strengths

- Recognizes that manpower requirements are derived from demand for service and that staffing patterns and productivity determine number of personnel needed.
- Facilitates study of manpower productivity, utilization, staffing ratios, and health team approaches.
- Encourages assessment of overall organization and effectiveness of the health care delivery system.

Weaknesses

- Standard setting may be unrealistically high.
- Requires extensive data collection on variables difficult to quantify - costly and time consuming.
- Usually ignores the effective demand for services.

References

Hall & Mejia, 1978, pp. 63, 67-68, 82
USDHEW (HRA), 76-14511, 1976, pp. 34-37, 44
USDHEW (HRA), 76-14512, 1976, pp. 40-49
Lave, Lave, Leinhardt, 1975, pp. 99, 100

TABLE 10 - DESCRIPTION OF THE HEALTH NEEDS
APPROACH TO ESTIMATING REQUIREMENTS

Description

- Uses health status of the planning population as main determinant of manpower requirements.

Methodology

- (1) Health status of population is quantified in terms of specific incidences/prevalences of disease, etc.
- (2) Professional opinion/empirical data is utilized to determine appropriate treatment for each disease.
- (3) Task analysis is performed to specify amount of time a typical practitioner would need to provide each treatment.
- (4) Service needs are translated into manpower requirements through staffing and productivity standards.

Strengths

- Appealing comprehensible logic with sound ethical base.
- Encourages evaluation of health technology.
- Promotes concern about team work and quality of care.
- Facilitates study of productivity, utilization and staffing ratios.

Weaknesses

- High cost and technical difficulties associated with defining and quantifying needs, treatments and manpower output.
- Needs sophisticated data systems, survey capabilities and planning expertise.
- Assumes no constraint to seeking care.

References

- Hall & Mejia, 1978, pp. 63-67, 82
- USDHEW, (HRA), 76-14511, 1976, pp. 37-40, 44
- USDHEW, (HRA), 76-14512, 1976, pp. 49-55
- USDHEW, (HRA), 79-10433, 1979, pp. 48, 49
- Lave, Lave, Leinhardt, 1975, pp. 99, 100

defined standards. These methods are (a) the Health Needs Approach, also known as the Professional Standards Approach, the Biological Needs Approach, and the Biological Care Approach; and (b) the Service Targets Approach, also known as the Normative Approach. While the opinion of experts is usually sought in the other methods, it does not generally form a major component of those approaches.

In spite of the methodological and practical difficulties associated with the Health Needs and the Service Targets Approaches, they still have a good deal of potential utility in health manpower planning and in the design of educational programs. These methods will attain additional importance as the health sector's ability to measure and respond to health needs and service targets increases.

Manpower/Population Ratio Method

The Manpower/Population Ratio Method, also known as the Fixed Population Ratio Method and the Personnel to Population Method, is the most popular and frequently used method for estimating the demand for health manpower and for characterizing supply. It utilizes an observed or desired manpower/population ratio either as the basis for estimating requirements, as an input to more sophisticated methodologies, or as a means of ratifying estimates derived by other methods.

A detailed description of this approach is given in Table 12. The validity of the estimates derived using this approach are dependent upon the appropriateness and fit of the ratio that is used. (USDHEW [HRA] 76-14511, p.34)

Health Demands Method

A wide variety of techniques for estimating the future demand for health services are currently being investigated throughout the world. Generally, these investigations attempt to estimate the demand for health services on the basis of demand functions that try to correlate the amount of care being sought with such variables as income, costs, access, age, and education. Most of these demand functions are based on the concept of "effective demand" and on the assumption that current or past correlations will remain constant over time. Of all the variables being investigated in association with demand functions, the economic ones usually receive the most attention.

The economic demand methods take into account the financial resources available to pay for the services of health personnel and focus on the "effective demand" for health care as the main determinant of the demand for health manpower. Various techniques, which revolve mainly around the analysis of health expenditure and service utilization data, are employed to calculate the economic (effective) demand and to convert this demand into manpower requirements.

TABLE 12 - DESCRIPTION OF THE MANPOWER/POPULATION
RATIO METHOD OF ESTIMATING REQUIREMENTS

Description

- Uses population size as the main determinant of manpower requirements and utilizes an observed or desired manpower/population ratio as the primary technique for computing the estimates of personnel needed.

Methodology

- Formula: $\text{Desired Manpower/Population Ratio} \times \text{Target Population} = \text{Estimated Requirements}$.
- The ratio used could be based on professional judgement, an existing local or national ratio, a ratio in existence in a comparable but better serviced area, or the ratio in existence in other countries at various levels of development (for comparative purposes).
- The numerator and denominator of the ratio have different meanings depending upon the matter under study at any given time.

Strengths

- Simple data requirements, low cost.
- Ease of application and interpretation.

Weaknesses

- May be dangerously simplistic and biased in favour of status quo.
- Ignores many important variables such as population density that are not evident through population size.
- Disregards possible changes in productivity, utilization and distribution.
- Assumes current ratios will be appropriate for future.

References

- Hall & Mejia, 1978, pp. 64, 73, 74, 83
- USDHEW (HRA) 76-14511, 1976, pp. 33, 34, 43, 44
- USDHEW (HRA) 76-14512, 1976, pp. 36 - 40
- USDHEW (HRA) 79-10433, 1979, pp. 51-52
- Lave, Lave, Leinhardt, 1975, pp. 102-104

The five main approaches available for use in projecting manpower requirements based on economic (effective) demand are described in Tables 13 through 17. Basically, these methods estimate requirements based on (a) employer perceptions of current and future manpower needs; (b) economic analysis of utilization or expenditure data; and (c) an industry-occupational matrix model in which the health industry and health manpower are viewed in the context of the total economy and the total manpower required to produce all the goods and services demanded by the community.

There are two other approaches for estimating requirements based on the health demands methods which, in spite of their more restricted use, are worthy of mention. Generally, these methods should only be used to assess the balance between supply and demand of a particular category of health workers, and not as a basis for estimating requirements. The methods are described below:

(a) Rate of Return - This method compares the cost of training various manpower categories with each category's subsequent lifetime earnings discounted to present day value. Comparison of the ratios derived for the different occupations provides the planner with an indication of where a given investment in training will produce the greatest economic return. (Hall & Mejia, 1978, pp.72-73)

TABLE 13 - DESCRIPTION OF THE CONSTANT UTILIZATION
WITH CHANGING POPULATION VARIANT OF THE
HEALTH DEMANDS METHOD OF ESTIMATING
REQUIREMENTS

Description

- Considers the size and composition of the population as the major determinants of the types and quantities of health services used, and that the types of services required create the demand for specific types of manpower.

Methodology

- The estimates of manpower requirements are derived from the estimates of the demand for services, which in turn are based upon the current service utilization pattern of each group in the population. The future demand for medical care, taking demographic shifts into consideration, is converted into projected manpower demand by applying the proportionate change in services used to the present manpower requirements.

Strengths

- Reliance on measures of effective demand.
- Estimates based on small segments of the population reflect cultural and physical characteristics of each subgroup.
- Analytical potential is enormous.

Weaknesses

- Underlying assumptions (e.g., that economic factors, such as price, will remain unchanged; and that a change in population will bring about a proportionate change in service demand) are weak and may not represent reality.
- Present utilization patterns may not be proper standard for the future.
- Broad data collection and technical expertise required.
- Disregards unmet needs for service.

References

- Hall & Mejia, 1978, pp. 69-71
- USDHEW, (HRA), 76-14512, 1976, pp. 64-70

TABLE 14 - DESCRIPTION OF THE CONSTANT UTILIZATION
WITH CHANGING POPULATION AND CHANGING INCOME
VARIANT OF THE HEALTH DEMANDS METHOD
OF ESTIMATING REQUIREMENTS

Description

- Derives manpower requirements from health care demand as determined by the utilization of services by population groups whose numbers, characteristics, and incomes are changing over time.

Methodology

- Base year utilization rates are applied to a like group in the target year - a group whose characteristics are defined by demography, income and type of care used. In broad terms, the estimates would modify the present requirements by accounting for the population effect, the income effect, and the effect of the interaction of population and income.

Strengths

- Reliance on effective demand measures.
- Introduction of changing income makes method more realistic for use in predominantly private sector health economies:

Weaknesses

- Disregards unmet needs for services from those who do not have access to care for whatever reason - e.g., geography, poverty, ignorance.
- Extensive data collection requiring considerable time, money and expertise.
- Assumption that factors other than demography and income will not change is unrealistic.
- Present utilization standards may be unrealistic for the future.

References

- USDHEW, (HRA), 76-14512, 1976, pp. 74-83

TABLE 15 - DESCRIPTION OF THE POPULATION AND INCOME
VARIANT OF THE HEALTH DEMANDS METHOD OF
ESTIMATING REQUIREMENTS

Description

- Bases the demand for services, and through it, the manpower requirements, on population and income alone.

Methodology

- (1) Population projections for the planning area are made.
- (2) Income elasticity of health expenditures is determined.
- (3) This value is used to translate the projected rise in disposable income into the amount likely to be spent on health services.
- (4) By means of staffing and productivity standards, these amounts are converted into probable manpower requirements.

Strengths

- Relatively simple to use and interpret.
- Based on the two variables deemed to be the chief determinants of the utilization of health services in predominately private sector economies.

Weaknesses

- Difficult to apply in developing countries due to lack of reliable data on income and income elasticity.
- Income elasticity estimates vary widely even in developed countries.

References

- Hall & Mejia, 1978, pp. 71, 72

TABLE 16 - DESCRIPTION OF THE INDUSTRY -
OCCUPATIONAL MATRIX VARIANT OF THE
HEALTH DEMANDS METHOD OF ESTIMATING
REQUIREMENTS

Description

- Projects manpower requirements on the basis of an industry - occupational employment matrix which identifies the percent distribution of an industry's employment by occupation and the percent distribution of an occupation's employment by industry.

Methodology

- (1) The occupations and industries to be covered in the local matrix are selected.
- (2) Future area employment in the selected industries is projected.
- (3) Estimates of future employment are obtained by multiplying the projected industry employment by the matrix ratio for each occupation.

Strengths

- Uses a solid base - census data and labor statistics.
- Two different techniques are available for use in adapting a national matrix for area projections.
- Can alter occupational structures and industry growth if alternative assumptions are likely to be realized.

Weaknesses

- Local staffing patterns may not fit national pattern.
- Assumptions inherent in national matrix could be unrealistic for local area.
- Use of fixed coefficients and ratios fails to account for flexibility, substitutability and improved manpower productivity.

References

- USDHEW, (HRA), 76-14512, 1976, pp. 83-93

TABLE 17 - DESCRIPTION OF THE BUDGETED JOB VACANCIES
VARIANT OF THE HEALTH DEMANDS METHOD OF
ESTIMATING REQUIREMENTS

Description

- Also known as an Area Skill Survey or an Employer Survey, this method uses a survey of employers to determine the number of current employees, budgeted vacant positions, turnover rates, and anticipated personnel needed in the target year (in full time equivalent positions).

Methodology

- (1) Scope of survey is defined in terms of geographic area, occupational categories and health facilities.
- (2) Survey (census or sample) is conducted by mail or personal interview with follow-up of non-respondents as required.
- (3) Manpower requirements are computed from data obtained.

Strengths

- Uses the best informed source of information, especially for the short term.
- Data collection is simple and inexpensive.
- Excludes "fictitious" budgeted vacancies for which no recruitment will take place.

Weaknesses

- Projections by employers may not be based on realistic expansion plans.
- Response and sampling errors are difficult to avoid and measure.
- Importance of appropriate wording of survey instrument and definition of key terms is crucial but sometimes overlooked.

References

- Hall & Mejia, 1976 p. 73
- USDHEW, (HRA) 76-14512, 1976, pp. 55-64

(b) Relative Earnings - This approach, sometimes used by economists to evaluate actual or potential manpower shortages, compares the rate at which the average earnings of one occupation have increased over a given period of time in relation to the rate of increase in other occupations. If, for example, physicians' earnings have increased only half as fast as professional salaries taken as a whole, it is inferred that there is a relative surplus of physicians. The applicability of this technique is limited by the fact that salary levels are influenced by political factors as well as by labor market forces. (Hall & Mejia, 1978, p.73)

Methods Based on Evidence in Comprehensive Prepaid Group Practice

The last method of estimating manpower requirements to be presented (see Table 18) involves the use of comprehensive prepaid group practice settings, such as the Health Maintenance Organizations in the United States, as comparison health care delivery systems. The rationale behind this approach is that the prepaid group settings are assumed to operate more efficiently than other health care delivery systems.

2.5.2 Strengths and weaknesses of requirements methodologies

The main strength of the two approaches based on professionally defined standards is their focus on the health status of the population and the provision of services as

TABLE 18 - DESCRIPTION OF A METHOD OF ESTIMATING
REQUIREMENTS BASED ON EVIDENCE IN
COMPREHENSIVE PREPAID GROUP PRACTICE

Description

- Considers comprehensive prepaid group plans as an optimum health care delivery system and uses the manpower/population ratio derived from these plans as the main determinant of health manpower requirements.

Methodology

- The manpower/population ratio is determined from an analysis of the numbers of professionals required to provide service to the enrolled population, while taking into account the percentage of providers in primary and secondary care, and task delegations as they impact on the productivity of the health care professionals.

Strengths

- Ready availability of comparative data.
- Use of standards - i.e., ratios from presumably more efficient practice settings.

Weaknesses

- Patients/clients of these plans are not representative of the general population - they are generally, better educated with higher standard of health.
- Number, mix and distribution of health professionals in these plans is determined administratively and would not necessarily correspond with other health systems.
- There are manpower ratio differences between the prepaid group plans.
- There may be utilization of health services outside the plans.
- There is no concrete evidence that these plans represent an ideal health care delivery system.

References

USDHEW, (HRA) 79-14033, 1979, pp. 53-54
Lave, Lave Leinhardt 1975, pp. 100-102.

opposed to the production of manpower. Both the Health Needs and the Service Targets Approaches recognize that manpower requirements are based on the demand for service and that staffing patterns and productivity have a large impact on the number of personnel required. The main weaknesses inherent in these approaches relate to (a) the difficulties involved in getting a consensus about health needs and service targets; (b) the extensive data collection required of variables difficult to measure; and (c) the failure of these methods to consider the consumers' willingness and ability to purchase or utilize the services they deem as necessary.

The Manpower/Population Ratio Method is easy to use and interpret to others and has modest data and staff requirements. Its main drawback is the fact that it fails to account for factors other than population size as determinants of demand. Further, the use of a current ratio ignores substitution possibilities and presupposes a future where utilization is similar and appropriate to the current one.

The Health Demands Approaches have several advantages to offer. Some variants of the method - e.g., Job Vacancy Surveys - are very simple. Other variants, while more costly and complex, provide a very comprehensive view of the dynamics of health services utilization and the

determinants of health care demand. Further, since planning utilizing these methods assumes that demand correlates will remain constant over time and since the estimates for requirements are related directly to future job opportunities, the risks of overstating the manpower requirements and of setting unrealistic objectives are avoided or minimized.

The disadvantages, both conceptual and operational, associated with the health demand methods are many. The conceptual weaknesses relate to the fact that most of the variants of this approach (a) ignore the impact of possible changes in certain important variables such as the price of services or third-party financing; (b) do not take into account the unmet needs for health care by the poor, the ignorant, and the geographically confined; (c) neglect the possibility of significant improvements in health services distribution and delivery due to political or societal reasons; and (d) do not consider the amount of health care the population needs in order to attain and maintain health. The operational weaknesses are due mainly to the vast amounts of data collection required and the need for very complex statistical analyses which require a high degree of technical expertise and the expenditure of considerable time and money.

The main attraction of the methods based on evidence in prepaid group practice plans is that these plans supposedly represent an ideal mode of practice wherein the enrolled population receive, at a very high standard, all the preventive, promotional, and curative health care that they need.

The main disadvantages are that (1) the prepaid practice plans are tightly administered and, therefore, do not necessarily represent the type of health care delivery system practised in a fee-for-service setting; and (2) the members enrolled in the prepaid practice plans are not representative of the national population. Based on their financial and educational background, they are generally of better health, have fewer complicated illnesses, and have less need for prolonged hospitalization than the general population does.

Whether these practice settings really represent an ideal mode of health care is a matter of debate, and the broad application of these approaches to the general population is really questionable given the method of administration and type of patient population associated with these plans.

Researchers have found that none of the methodological approaches to estimating manpower requirements has a proven superiority over the others and that there is no "best" method or combination of methods for estimating requirements that is applicable in all situations. The availability of several different methodological approaches enables the planner to select from among the existing methods rather than have to develop a new technique, but, in so selecting, he/she must bear in mind that the conclusions derived from a manpower study will, in a large part, be determined by the planning methodology utilized.

2.6 Summary of manpower planning strategies

A review of Sections 2.4 and 2.5 reveals a variety of methodological approaches for estimating current and future supply and requirements for health manpower. In summary, these approaches are as follows:

Methodological Approaches to Estimating Supply

Current Supply

- (1) Employer Survey
- (2) Licensure Survey

Future Supply

- (1) Increments -
 - (i) Inventory of Educational Institutions
 - (ii) Computation of New Licentiates
- (2) Losses -
 - (i) Life Tables Method
 - (ii) Labor Force Separation Rates Method
 - (iii) Cohort Method
 - (iv) Approximations
- (3) Trend Analysis of Annual Supply

Methodological Approaches to Estimating Requirements

- (1) Methods Based on Professionally Defined Standards
 - (i) Health Needs Approach
 - (ii) Service Targets Approach
- (2) Manpower/Population Ratio Method
- (3) Health Demands Method
 - (i) Constant Utilization Rate with Changing Population Approach
 - (ii) Constant Utilization Rate with Changing Population and Changing Income Approach
 - (iii) Population and Income Approach
 - (iv) The Industry-Occupational Matrix Approach
 - (v) Budgeted Job Vacancies Approach
- (4) Method Based on Evidence in Comprehensive Pre-paid Group Practice

Obviously, these methods have varying degrees of merit, and the unique strengths and weaknesses of each have an impact on their applicability in different situations. Health planners must, therefore, select the method or methods that best suit the task at hand, given the amount of staff and the level of technical expertise and financial resources available. Where possible, it would be advantageous for the planner to make projections based on several different methods. This would provide a range of projections that would give a broader, more solid base for health manpower planning than any single projection could.

3.0 MANPOWER PLANNING ACTIVITIES WITHIN THE PROVINCE

3.1 Commissions, committees, studies, reports

Several formal health manpower planning activities have taken place within the Province in relation to the major health professional groups. The main committees, studies, and reports will be described briefly in this section.

3.1.1 The McFarlane Commission

For some years prior to 1965, Memorial University had been considering the feasibility of establishing a Health Sciences Centre attached to the University. In May of that year, a group of physicians, chaired by Dr. J. A. McFarlane, were commissioned by the University to undertake a study of this matter.

The Commission's findings were embodied in a series of eight recommendations, the first of which was that planning for a Health Sciences Centre be instituted as soon as possible and that a Dean for the Faculty of Medicine be sought in 1966 (McFarlane, et al., 1966). The other recommendations dealt mainly with size and control of the associated university teaching hospital, the establishment of other teaching units in St. John's, and preparation of the university facilities to accommodate the new school. Recommendation six, however, dealt with other professional

groups and suggested that a School of Nursing be developed as part of the Health Sciences Centre and that a School of Dentistry be planned for the future.

The Commission's report was approved by the Board of Regents and the Senate of the University and circulated to individuals or groups interested in the problems of medical education within the Province. This report was one of the key documents later reviewed by Lord Brain as part of his assessment of the medical situation in Newfoundland and served as reinforcement for Lord Brain's independently arrived at conclusion that a medical school should be established in the Province.

3.1.2 The Royal Commission on Health (1966)

A Royal Commission on Health was appointed by the Lieutenant Governor-in-Council in February of 1965 to examine "the whole situation with respect to medical services and hospital facilities throughout the Province." The Right Honorable Lord Brain served as Commissioner and presented his findings in three separate volumes in January, July, and October of 1966 (Brain, 1966).

Lord Brain's main finding was that the provision of adequate medical services in Newfoundland could not be achieved without a medical school in the Province. Of the 43 recommendations presented in his report, 21 dealt with the need for a medical school; 13 were suggestions for

reorganization within the Department of Health, primarily the regionalization of health services, the establishment of hospital boards, and the hiring and remuneration of physicians; 6 each related to dental manpower and the anticipated impact of the introduction of Medicare to the Province; and the remaining 8 dealt with nursing, psychiatric care, adult rehabilitation, and the possible transfer of functions from physicians to less highly trained personnel.

3.1.3 The Royal Commission on Nursing Education

In February, 1972, Dr. Leonard A. Miller was commissioned by the Lieutenant Governor-in-Council to conduct an enquiry into nursing education, licensing, and regulation within the Province. Doctor Miller's report to the Lieutenant Governor, of February, 1974, contained 24 recommendations, one of which dealt with regulation and two with licensure (Miller, 1974, pp. 11-14).

Doctor Miller suggested that the following two recommendations (as well as the four to five recommendations which evolve from these two) are the most important in the report:

- (i) that diploma nursing programs be placed within the general education system, and
- (ii) that diploma nursing programs be no longer than two years' duration. (p. 9)

It is interesting to note that neither of these recommendations has been implemented and that the one two-year diploma program that was in existence in the Province has recently been extended to thirty months. In point of fact, aside from the two recommendations which suggest maintaining the status quo with respect to the number of nursing and nursing assistant schools in the Province, it would appear that only three of the remaining 21 recommendations have been or are in the process of being implemented. These three recommendations deal with licensure for nursing assistants, increased efforts to equate local nursing salaries with the higher levels in the Maritimes, and the offering of more suitable postgraduate courses for nurses at Memorial University. While government did approve the transfer of diploma schools into the general education system in principle, the move was never actually carried out due to postponement (for financial reasons) of the construction of the proposed Polytechnical Institute which would have housed the new school.

3.1.4 Nursing Resources in Newfoundland

In June of 1972, the provincial nursing association released a nurse manpower report entitled Nursing Resources in Newfoundland (ARNN, 1972). This report had been prepared by the ARNN with the assistance of Dr. B. DuGas and Miss R. Sametz of the Health Manpower Planning Division of the Department of National Health and Welfare.

The report presented an analysis of the current nursing situation and made projections regarding supply and requirements to 1976. The supply projections were based on the extrapolation of past trends into the future. Projected requirements were based on nurse/population ratios.

According to the report, there were three major deficiencies in the present and anticipated supply of nurses in the Province. These were: (1) that Newfoundland does not have an adequate supply to meet current or anticipated requirements; (2) that there are deficiencies in the system for producing nurses, the two most notable being the lack of prepared people to assume leadership positions in the Province and the lack of nurses with public health preparation; and (3) the marked rural-urban disparity in the concentration of the nurse population.

Ten recommendations were presented in the report. Two of these recommended expanding enrollments in the Province's schools of nursing. The remaining recommendations dealt with (a) the need for close monitoring and more research into the nursing situation and (b) the need to increase the educational preparation of nurses working in leadership roles and the community health field.

3.1.5 Health Care Delivery: An Overview

Health Care Delivery: An Overview is the report of a Health Study Group that had been established by government in 1972 to provide information about Newfoundland health services and alternative methods of health care delivery for the future. The Group, which was chaired by Mr. R. J. Burnell, had representation from Memorial University and the Provincial Departments of Health, Social Assistance, and Recreation and Rehabilitation.

The purpose of the report was to provide government with background material for use in reviewing the findings of the Health Planning and Development Committee. This Committee, which had federal and provincial representation, had been established by government earlier that year to design a system of health and social services which would ensure basic health standards for all Newfoundlanders. A change in government led to a change in policies and priorities, and the work of the Planning and Development Committee was suspended. Prior to this, however, the Committee had prepared its first report which assessed the needs of the central region of the Province. Other reports followed later, but these were not regional in scope and focused rather on the institutional needs of various communities.

The material presented in Health Care Delivery: An Overview is based heavily on the data prepared for the Health Planning and Development Committee's Report No. 1. (Health Planning and Development Committee, March, 1972) This is due to the fact that all members of the Health Study Group had also served (as provincial representatives) on the Health Planning and Development Committee.

A major feature of the report was a historical account of the development of the health care system in the Province and a description of the system as it then existed. Other aspects of the report dealt with policy options for health services in terms of provision and access to institutional and community care, functional roles for the various facilities, shortcomings in many of the health services then available, and the distribution, regulation, and education of health professionals.

Seventy-six recommendations were presented in the report with a cautionary note that, although the term "recommendations" was used, many of the recommendations on policy options were no more than preferences of the Study Group and that further research and study would be needed before firm and detailed recommendations could be made.

A good deal of emphasis was placed on the need to educate and employ family practice nurses (nurse practitioners) in the Province. The other "manpower" recommendations dealt with improving community health nursing services, physician distribution, productivity and remuneration and health manpower training both within and outside the Province. Several of the manpower recommendations were implemented in the Province, including those relating to the establishment of nurse practitioners in the Province.

3.1.6 Federal-Provincial Advisory Committee on Health Manpower

The Federal-Provincial Advisory Committee on Health Manpower is an advisory committee which reports to the Ministers of Health Conference through the Deputy Ministers Conference. The Committee has been in existence since 1972 and meets twice a year. Membership consists of representatives from each of the provinces and territories and from Health and Welfare Canada. Newfoundland has two formal representatives on the Committee - usually the Director of Health Manpower Planning and an Assistant Deputy Minister.

The Advisory Committee has had at its disposal the resources of the Manpower Directorate of Health and Welfare Canada and has been instrumental in the organization of expert committees, notably on Physician and on Nursing Manpower. It provides a formal medium for an exchange of

information on health manpower in Canada and, to some extent, for coordinating the efforts of the provinces relative to manpower planning. The staff of the Manpower Directorate undertakes studies which are of national interest and, in some instances, studies have been contracted with outside experts.

3.1.7 The Newfoundland Hospital Association Manpower Committee

The Newfoundland Hospital Association has, over the years, been very active in manpower planning activities. Throughout its history, it has made various attempts to forecast manpower requirements. Three employer surveys were completed over the period 1972 - 1977. These surveys, while useful as predictive tools, had some drawbacks, the main ones being: (1) that the supply and requirement figures were not compiled in terms of full-time equivalents and (2) that reasons for the projected requirements were neither requested nor provided.

In 1975, the Newfoundland Hospital Association established a manpower committee. The terms of reference of the committee were later expanded to include personnel relations. Current membership on the committee includes representation from the province's hospitals and nursing homes and the Department of Health, with ex officio membership by NHA officials. Representatives of the Classification and

Pay Division of Treasury Board, attend the meetings on request.

This committee works closely with the Manpower Planning Division of the Department of Health - indeed, the annual inventory of health and social service personnel prepared by the Manpower Planning Division is a joint project with the Newfoundland Hospital Association through this committee.

3.1.8 Health Sciences Education Feasibility Study

As a result of requests from various health professions in the Province, the President of Memorial University, in early 1976, appointed a multi-disciplinary committee to study the feasibility of establishing additional health science degree programs at that institution. The study was to cover only those programs not already in existence within the Province.

Over the next year and a half, detailed reviews were made of the education and practice of Physiotherapy and other rehabilitative health sciences and of Dentistry and Pharmacy. A subcommittee was established to consider manpower, academic programs, and facilities for each of the three areas, with membership on each subcommittee being drawn from the main committee. The final reports of the various subcommittees were endorsed by the main committee and, in

turn, presented to the President on June 30, 1977, as a consensus of that committee's views.

The principle recommendations arising from the study are identified below:

- that a degree program in Physiotherapy be started at Memorial University
- that a degree program in Occupational Therapy not be established at Memorial University at that time
- that a degree program in Pharmacy be initiated as a joint endeavour by the College of Trades and Technology and the University and that the program lead to a baccalaureate degree at Memorial
- that, while a Dental School at Memorial University was desirable, it was not feasible at the point in time
- that steps be taken to encourage the recruitment of Newfoundland students into dental schools elsewhere in Canada
- that a pre-dental diploma be introduced and that a faculty dental advisor be appointed

The report of the committee was accepted in principle by government, but implementation of those recommendations requiring capital expenditure was deferred due to fiscal restraint. An interim arrangement was made with Dalhousie University with respect to increasing the intake of Newfoundland students interested in physiotherapy until such time as Memorial University is ready to offer its own physiotherapy program. It is anticipated that the pharmacy program will admit its first class during the 1985-86 academic year, subject, of course, to available funding.

The recommendation against an occupational therapy program at Memorial University had been based, in large part, on plans by Dalhousie University to establish such a program in the immediate future. Unfortunately, those plans have not yet come to fruition.

3.1.9 Provincial Advisory Committee on Health Manpower

A Provincial Advisory Committee on Health Manpower was established by the Minister of Health in early 1976. The Committee's role was to determine the needs of this Province's health care system for the various categories of manpower and to ensure efficient supply, deployment and utilization of the manpower.

The Committee had a two-tiered approach, with a main committee and a number of working parties. The main committee consisted of senior representatives (at the deputy, assistant deputy, president, and vice-president level) from the Departments of Health, Rehabilitation and Recreation, Education, Manpower and Industrial Relations, as well as Memorial University, the College of Trades and Technology, the Newfoundland Hospital Association, the Canadian Public Health Association, and the Federal Department of Manpower and Immigration. Thus, total membership on the committee, while small (11), brought together the policy makers in health, education and labor, and in the major user groups as well.

The second tier of the Committee was to comprise various working parties, one for each of the major health professions. The working parties were to be responsible for identifying or assisting in the development of the individual profession's viewpoints and objectives in manpower planning, while the main Committee's responsibility was to incorporate the individual professional statements into a comprehensive and integrated health manpower program for the Province.

This Committee was advisory to the Minister of Health and related to two other manpower committees. These were the Federal/Provincial Health Manpower Committee and the Manpower Needs Committee. The former committee was described in Section 3.1.6. The latter committee, a joint federal/provincial body constituted by the signing of a formal agreement, was established in 1972. Its role is to assess national and provincial manpower requirements and general training needs. It has several subcommittees representing major industries in the Province, and the proposed Advisory Committee on Health Manpower would act in a similar capacity for the health industry.

In spite of the good intentions in forming this committee, only two meetings were held. During these meetings, draft terms of reference were developed for working parties on medical, nursing and dental manpower, and a brief

discussion paper was prepared by the Department of Health on selected five-year projections. The work of the committee was hampered by the lack of a firm policy by government with respect to the regionalization of health services and the location and targeted construction dates of further regional hospitals. This factor led to the dissolution of the committee. With the disbanding of the committee, action on the working parties ceased as well.

3.1.10 Faculty of Medicine Medical Manpower Advisory Committee

In February of 1978, a Medical Manpower Advisory Committee was established by the Dean of Medicine at Memorial University. This Committee was to be advisory to the Dean on matters pertaining to medical manpower and was to make recommendations on request regarding such matters as the appropriate class sizes for Memorial's undergraduate medical program, as well as its internship and residency programs. The Committee was also asked to develop and maintain a medical manpower data bank and to act as a resource centre for medical students and physicians seeking information about the provincial and national medical manpower situation.

While it was recognized that other bodies such as, the Newfoundland Medical Association and the Department of Health would also have need for manpower data, the terms of reference stipulated that interpretations of data derived

by the Committee were to be considered internal to the Faculty of Medicine and, therefore, were to be provided only to the Dean.

The Committee, which had representation from Memorial University, the Newfoundland Medical Association, the Newfoundland Medical Board, the Newfoundland Medical Care Commission, and the Department of Health, held eight meetings over its two-year history. During this time, three surveys of practising physicians were conducted, as well as a survey on the whereabouts and activities of the graduates of Memorial University's Medical School from its inception through 1977. (Collection of this latter data, from the School's inception through to 1982, has since been completed and the data computerized.) The activities of the Committee were suspended in 1980 pending the development of a national physician data bank by the Canadian Medical Association.

3.1.11 Ministerial Medical Manpower Advisory Committee

A Medical Manpower Committee advisory to the Minister of Health was established in the fall of 1980. This committee was established on the recommendation of a smaller ad hoc committee consisting of the Deputy Minister of Health and two representatives of the Newfoundland Medical Association, which had been in existence for some time advising on medical manpower issues, primarily requests by physicians for Permanent Residence Status.

That committee, recognizing the limitations of its role, recommended that its scope be broadened to include additional manpower related activities such as advising on requests for fee-for-service payments to locum physicians, having input into the development of the physicians' residency bursary program, and making recommendations to the Department of Health and other agencies regarding the establishment of guidelines and the setting of objectives for manpower activities.

Membership on the new committee included two representatives of the Newfoundland Medical Association, the Medical Director of the Newfoundland Medicare Program, the Medical Consultant with the Department of Health (Chairman), and the Director of Health Manpower Planning.

The Advisory Committee continued in existence for some time on that basis. However, in July of 1983, the terms of reference and membership were once more expanded, this time to give the committee the mandate to advise the Department on (a) the recruitment (and payment) of short-term locums who are not fully registered in this Province; (b) requests to hire provisionally registered physicians by large hospitals in urban areas where adequate physician stocks should be available; and (c) the ongoing requirements for physicians in this Province with respect to the Department of Health Manpower Data Bank. Representatives from

other agencies such as the Newfoundland Medical Board and Memorial University Medical School are to be invited to participate, on an as needed basis, in the manpower planning activities.

3.1.12 St. John's Hospital Council Report

In 1978, the St. John's Hospital Council employed a consulting firm, McKinsey & Company, Inc., to determine future requirements of clinical services and programs in St. John's. The consulting firm made its report in March of 1979 (McKinsey & Co., 1979). While the report dealt mainly with clinical services in St. John's, it did, to a certain degree, assess provincial health manpower requirements. Its findings and recommendations in this regard are encompassed in the following quote:

Newfoundland has a comparatively low supply of virtually every category of health professionals; in the key areas of physicians and nurses, numbers are currently adequate, but actions are required to carefully monitor possible decline due to attrition, while, in other categories - such as dentists - policy decisions are needed on the relative priorities of needs for costly corrective programs. (p.44)

3.1.13 Nurse Manpower Committee

In June of 1980, the Council of the Association of Registered Nurses of Newfoundland, in collaboration with the Department of Health, established a Nurse Manpower Committee. This Committee had representation from both those organizations as well as from the Department of Social Services, the

Newfoundland Hospital Association, Employment and Immigration Canada, and the various health regions in the Province.

The main findings of the Committee were that, while the Province was not at that time experiencing a generalized nursing shortage, there had been serious nursing shortages in certain institutions and/or specialty areas in the Province over the previous two years. The findings also showed that those shortages were resolving themselves satisfactorily at the time of the report.

A total of 43 recommendations were made dealing with nursing service, education and manpower, the need for a good data base, and the need for further research. The two main recommendations of the report were (a) that the level of enrollments in nursing programs be maintained at their current level and (b) that a standing committee on nursing manpower be established to assist in planning for the future. Both of these recommendations have been implemented, and the new committee is now conducting a followup on the findings of the report.

3.1.14 Subcommittee on Nursing Assistant Manpower

The Council for Nursing Assistants, a ministerial advisory committee on the educational and work related needs of nursing assistants, established a subcommittee on nursing assistant manpower in September of 1980. This subcommittee, with the assistance of the Manpower Planning Division of the

Department of Health, (a) conducted a followup survey of all nursing assistants who had graduated in the Province during 1978, 1979, and 1980; (b) surveyed employers as to projected need for nursing assistants; and (c) collected unemployment and employment data on nursing assistants from various sources.

The subcommittee's findings, released in January, 1982, were that the current supply of nursing assistants was adequate (with a certain degree of oversupply in some areas) and that the projected supply would be sufficient to meet the need over the next four-to-five-year period. (Council for Nursing Assistants, 1982)

Five recommendations arose from the report, the two most important being that the current number of and levels of enrollment in nursing assistant programs in the Province be continued and that some method of annual registration be developed to permit an ongoing monitoring of the nursing assistant manpower situation.

3.1.15. Government's Five Year Plan

In October of 1980, the provincial government released a development plan for the province's resources for the period 1980 - 1985. The main areas identified for development in the health sector over the five year period were hospital facilities and services, special health care

programs (including speech therapy, audiology, and rehabilitative services), health manpower, accessibility to health care services, public health, health promotion, and long-term care (pp.120-123).

The program areas designated for development in the social service sector were social assistance, employment opportunities, services to the mentally handicapped, services to senior citizens, day care and teaching homemaker services, child welfare and juvenile corrections, and rehabilitation. In addition, government agreed to explore fully the effects of oil and gas on the delivery of social services (pp.123-126).

Government's specific commitment vis-a-vis health manpower was embodied in the following quote:

The provision of adequate numbers of trained personnel to deliver quality health care, especially by providing opportunities to Newfoundlanders, and thus lessening our dependence on the importation of trained personnel. (p.122)

Government has lived up to this commitment in part by increasing the bursary funds available to Newfoundlanders willing to train in undersupplied professions such as physiotherapy, occupational therapy, medical specialties, nursing specialties, and the public health field. In addition, more emphasis is being placed on the recruitment/enticement of local graduates back to the Province. Arrangements have

also been made with Dalhousie University for some increase in the training slots available to Newfoundland students interested in enrolling in physiotherapy and the newly developed occupational therapy program. Plans are in the making as well for the establishment of a physiotherapy school at Memorial University when feasible.

3.1.16 The Royal Commission on Hospital and Nursing Home Costs

In April of 1983, the Minister of Health announced the appointment of a Royal Commission, chaired by Mr. David Orsborn, to study hospital and nursing home costs. The terms of reference of the Commission include, but are not limited to:

- (1) a determination of why hospital and nursing home costs are increasing at a higher rate than the normal rate of inflation
- (2) an assessment of what operating efficiencies could be achieved in hospitals and nursing homes
- (3) a determination of the appropriate level of funding for hospitals and nursing homes to operate current approved services
- (4) the projection of increases likely to occur in institutional costs for the next five years based on current approved services and future planned services

- (5) the development of appropriate levels of services and/or viable alternatives for program reductions should cutbacks be necessitated due to limited financial resources
- (6) the identification of appropriate measures for the generation of revenues to meet growing institutional costs, taking into account current and planned services, the fiscal capacity of the Province, and projected federal revenues
- (7) the provision of a report to government by February 15, 1984. (Government of Newfoundland and Labrador, 1983)

Two of the prime factors to be studied in association with term of reference number one are manpower related. They are (a) an assessment of the impact of medical, nursing, and other educational programs and (b) the impact of increased medical manpower.

The medical aspects of this topic are being studied by a consulting firm, Woods-Gordon, and the Commission's staff. In addition, a Medical Manpower Advisory Committee has been established to assist the Commission in this task. A specific study has been designed on medical manpower, the purpose of which is to assess the impact that changes in medical manpower have had and will have on utilization and

costs of the hospital and nursing home system. A medical manpower data bank will be compiled as part of this exercise.

Material on the non-medical factors are being compiled by the Commission and its research staff.

3.2 Establishment of Manpower Planning Division

With the wide variety of manpower planning activities either in effect or required, it was felt that a concerted effort should be made to centralize and coordinate these activities and to develop a firm data base upon which realistic projections, policies, and programs could be based. To achieve this objective, a Manpower Planning Division was established within the Department of Health in early 1978.

The activities of the Division have, for the most part, revolved around the compilation of inventories of the various groups of health care professionals and of health education training programs and the development of a health manpower data base. Much of the Division's work originates from the staff's membership or chairmanship of several manpower committees, notably the Nurse Manpower Committee, the Council for Nursing Assistants, the Medical Manpower Advisory Committee, the Health Education and Bursary Review Committee, the Newfoundland Hospital Association Manpower and Personal

Relations Committee and the Federal/Provincial Advisory Committee on Health Manpower.

The main reports prepared by the Division to date are listed below:

- Health and Social Service Manpower in Newfoundland and Labrador - an annual inventory which commenced in 1980
- Registered Nurse Manpower in Newfoundland and Labrador 1980, 1983 - a statistical report, based on a computerized data base, of current nursing supply in the Province
- Follow-up Survey of All Graduates of Nursing Assistant Programs in Newfoundland During the Years 1978 - 1980
- Inventory of Health and Social Service Training Programs in Newfoundland, 1982 - an annual report
- Bursary Policy Manual, 1982

In addition, the Division played a large part in the production of the Nurse Manpower Report (ARNN, 1982) and the Report of the Subcommittee on Nursing Assistant Manpower (Council for Nursing Assistants, 1982).

3.3 Summary

As is evidenced by the material presented in this section, a good deal of health manpower planning activities have taken place in the Province to date. These activities have been coordinated mainly by government and Memorial University and have had representation from the employer and educational organizations and the professional groups. Both

the nursing association and the hospital association have been active in this field and, in several cases, have taken the initiative and set up either an ad hoc or a standing committee to monitor the current situation and to project future supply and requirements.

The main manpower planning strategies used by the different groups were employer surveys and the use of expert opinions of requirements. Some groups have made an attempt at forecasting requirements mostly on the basis of a manpower/population ratio or an employer's opinion of projected needs.

4.0 NURSE MANPOWER

An estimation of the current and projected nurse manpower supply and requirements utilizing various manpower planning strategies will be given in this section. Prior to getting into detailed calculations, however, some discussion of national trends and issues will be presented.

4.1 National perspective

4.1.1 Assessment of current labor market

In the late 1970's and early 1980's, a shortage of nurses was experienced internationally. In Canada, the effects of this shortage were felt in all provinces and territories. However, the problem was more acute in the provinces with poor climates and/or less competitive salary rates since, due to the shortages in the other provinces, many nurses were lost through outward migration. This situation has now reversed itself, and, with a few minor exceptions in some very isolated communities and within certain nursing specialties, all provinces currently have an adequate supply of nurses.

This reversal is undoubtedly related to the economic downturn and the fact that many nurses are now being forced economically to either return to work or to work longer hours in order to supplement their family incomes. Improved nursing salaries in many areas have also contributed to this trend.

It is worthy of note that nursing shortages appear to occur in a cyclical pattern (The Bulletin, 1981). This would seem to be related to the fact that nursing is an almost exclusively female occupation and, therefore, is subject to the wide variations in labor force participation rates practised by women. In the past, women, whether they were seeking full-time or part-time employment, tended to move into and out of the labor market according to their personal circumstances and preferences. These movements were most notably related to their husband's income level and the number of preschool and school-age children they had. Smaller family sizes, worsening economic conditions, and the changing role and status of women in society are all contributing to a changing pattern of labor force participation rates. These changes will continue to evolve as women adapt to the numerous demands placed on them from their various roles in today's society.

4.1.2 Issues, trends

The major manpower related issue of national scope in nursing today is the debate over the baccalaureate degree (B.N.) as the entry to nursing practice by the year 2000. A motion to this effect was passed by Canadian nurses at their biennial convention held in St. John's in June, 1982.

Controversy about the issue has been rampant across the country, and one province, British Columbia, has already taken a formal stand against the move. The matter is now under consideration by the other provinces, with a great deal of concern being expressed about the possible implementation of educational requirements that are not necessary for safe practice. Given the substantial lead time, however, this issue, while supported by the Association of Registered Nurses of Newfoundland, will not affect nurse manpower supply or requirements in Newfoundland over the next five years - the planning time frame for the projections to be made in this thesis.

Two other issues of national significance are (a) the trend towards all registered nurse staffing in certain hospitals and/or nursing units across the country and (b) the desire on the part of nurses for an expanded role. The former issue may have some effect locally over the next five years due to the constant increases in the complexity of care, particularly in tertiary care hospitals and special care units. The matter of an expanded role for nurses has been explored in some depth in Newfoundland in the past through the Family Practice Nurse Program at Memorial University. While that program graduated fourteen nurses over a two-year period, only three of them are now practising in

the Province in their expanded roles. This reflects the low level of acceptance of the program. While this whole area may be re-explored in the future, it is unlikely that it would have any impact on nursing requirements or supply in the Province over this thesis-planning time frame.

4.2 Current provincial requirements and supply

Due to the availability of usable statistics, secondary data will be employed to estimate current requirements and supply. In order to obtain consistent and comparable data over time, January, 1983, was used as the base time.

4.2.1 Current requirements

Statistics obtained from the Provincial Departments of Health and Social Services show that, as of January 1, 1983, there were requirements, based on effective demand, for 2827 registered nurses (in full-time equivalent positions) in this Province (see Table 19). As can be seen from the table, only nineteen of these positions were vacant as of that date. All of the unfilled positions, it might be noted, were left vacant due to budget restraints.

Appendix A provides a listing by category of the various employing agencies represented in Table 19. These agencies include all hospitals and nursing homes/ homes for special care in the Province, as well as the

community health field and the nursing stations in the northern region of the Province. Excluded are nurses employed in industrial settings; general educational settings - i.e., Memorial University and the College of Trades and Technology; physicians' offices; and small health related agencies such as the Victorian Order of Nurses, the Canadian Red Cross, and the Canadian Cancer Society.

TABLE 19

NURSE MANPOWER SITUATION IN NEWFOUNDLAND, JAN., 1983

<u>Type of Employing Agency</u>	<u>Positions</u>		
	<u>Established</u>	<u>Filled</u>	<u>Vacant</u>
General Hospitals	2225	2208	17
Government Operated Hospitals	108	106	2
Nursing Homes/Homes for Special Care	294	294	0
Other	200	200	0
	2827	2808	19

Sources: Department of Health, Health and Social Service Manpower in Newfoundland and Labrador, 1982, St. John's, Newfoundland, 1982.

Verbal communication with officials of the Departments of Health and Social Services

Table 20 presents a breakdown of the types of nurses' employing agencies. As can be seen, the hospitals, nursing homes/homes for the aged, and the community health field represent approximately 95-97% of all nurses in the Province, (using 1981 as proxy time data).

TABLE 20
TYPE OF EMPLOYING AGENCIES OF NURSES
EMPLOYED IN NURSING IN NEWFOUNDLAND, 1981

<u>Employing Agency</u>	<u>Count</u>	<u>%</u>
Hospitals	3211	79.4
Nursing Homes/Homes for the Aged	348	8.6
Community Health	250	6.2
Physicians' Office/Family Practice	21	0.5
Educational Institutions ^a	73	1.8
Other	104	2.6
Place of Employment Not Specified	36	0.9
	4043	100.0

^a Includes Schools of Nursing

Source: Department of Health, Registered Nurse Manpower in Newfoundland and Labrador, 1981, St. John's, 1983:

4.2.2 Current Supply

While there were 2827 established full-time equivalent registered nurse positions in the Province in January of 1983, there were 4371 nurses with active licences who were filling these positions (See Table 21). It should be noted, however, that 1173 of these nurses were working on a part-time basis.

TABLE 21

NURSING REGISTRATION STATISTICS 1978-1982

	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Active Registration ^a	3751	3911	4087	4228	4371
Inactive Registration ^b	563	574	600	589	570
TOTAL REGISTRATION	<u>4314</u>	<u>4485</u>	<u>4687</u>	<u>4817</u>	<u>4941</u>
Active Registration:					
% Nfld. Graduates	79.3	79.8	80.1	78.7	79.5
% Canada Graduates	10.9	11.4	10.5	10.1	9.4
% Other Graduates	9.7	8.8	9.4	10.2	9.3
% Place of Graduation Missing	-	-	-	1.0 ^d	1.8
% Males	1.2	1.3	1.3	1.0	1.2
No. Employed Part-Time	672	751	970	1114	1173
No. Employed Full-Time	3079	3160	3117	3114	3198
Lapsed Membership ^c	315	277	256	235	277

^a All individuals practising as registered nurses in Newfoundland are required by law to have a current active licence. All the 1982 active nurses were employed within the Province with the exception of the 80 who were employed by Health and Welfare Canada and the Canadian Armed Forces for potential employment in the Province and the 14 new Newfoundland graduates who were unable to find employment in the fall of 1982.

^b The number of inactive licences is an understatement of the number of inactive nurses, since it is not mandatory for nurses who are not employed in nursing to maintain licensure (either active or inactive) within the Province.

^c Prior to 1980, the number of nurses who let their membership lapse each year was determined by computing the number of nurses who had held active registration one year and did not renew their registration (actively or inactively) by March 31 of the next year. During 1980 and 1981, the lapsed membership count was based on the number of nurses who did not renew their licence by the end of April each year. In 1982, it was calculated May 30.

Source: ARNN Annual Statistics (which are calculated December 31 of each year)

A certain degree of oversupply exists at present with several hospitals reporting that they have waiting lists of nurses seeking employment, both part-time and full-time, and that many of their part-time staff would like to increase their nursing hours per week. This indication of an oversupply is supported by (1) the fact that fourteen of the 277 1982 nursing graduates were unable to find employment within the Province during the fall of 1982 and (2) by January unemployment statistics obtained from Canada Employment and Immigration Commission officials as shown below:

Registered Nurses Registered as Seeking Employment in Province	323
Registered Nurses Receiving Unemployment Insurance Benefits	416
Registered Nurses Receiving Maternity Benefits	64*

*Included in above count of 416.

It should be noted that local nursing authorities question the unemployment figures cited above since most of the nurses registered as seeking employment are not equally employable due to location, flexibility, and/or performance record. This concern was borne out by the fact that an average of 87 nurses were registered as actively seeking employment with the various Canada Employment Centres throughout the Province during the summer months of 1981, a time in which there was a 10%-11% vacancy rate (280-330 vacant positions) in the Province. (ARNN, 1982, p.61)

A point of note with respect to the number of nurses receiving Unemployment Insurance benefits is that the 64 nurses on maternity claims may not have been planning on an immediate return to the active work force when their claims expired.

In spite of the limitations outlined, the Canada Employment data will be used in estimating future supply due to a lack of available statistics on the numbers seeking employment from other sources. The number of nurses registered with the Canada Employment and Immigration Commission as seeking employment, 323, combined with the number of nurses with active licences in the Province, 4371, comprise the current active supply - 4694 registered nurses.

It is very difficult to estimate current potential supply due to the very limited information which is available regarding the pool of inactive nurses. Since inactive nurses are not required by law to maintain licensure, the vast majority do not and, therefore, cannot be enumerated. It is felt, however, that the potential pool would be substantial since nurses who graduated in the 1940's are still in their pre-retirement years.

Table 22 shows the total number of graduates of Newfoundland Schools of Nursing to date as being 6577. Considering this factor and the facts that (a) only slightly in

TABLE 22

GRADUATION STATISTICS-
NEWFOUNDLAND SCHOOLS OF NURSING, 1903-1982

	Prior to Sept. 1970	1970 to 1971	1971 to 1972	1972 to 1973	1973 to 1974	1974 to 1975	1975 to 1976	1976 to 1977	1977 to 1978	1978 to 1979	1979 to 1980	1980 to 1981	1981 to 1982	Total to Date
<u>Gra- duates</u>	3549	270	236	228	241	260	275	325	297	247	254	228	277	6689 ^a

^aAll graduates of Memorial University School of Nursing are included in these statistics. As a result, there is a certain amount of double counting since registered nurses who completed their B.N.'s are counted twice. The reason for the duplication is the unavailability of separate statistics on B.N.'s and post R.N. B.N. graduates. In total, roughly 101 R.N.'s have now completed their B.N.'s, thus reducing the total count^a to 6588.

Note: Commencement dates of Schools of Nursing:

General Hospital	1903
Grace General Hospital	1929
St. Clare's Mercy Hospital	1939
Memorial University	1966
Western Memorial Regional Hospital	1969

Source: Association of Registered Nurses of Newfoundland, Nurse Manpower Report, St. John's, 1982, p.32

excess of 3475 Newfoundland graduates are currently active (some of the 80 nurses with Health and Welfare Canada and the Canadian Armed Forces are employed in Newfoundland) and (b) a certain number of foreign graduates are also likely to be residing here but not actively practising, the potential supply would indeed seem to be high. Needless to say, however, not all of these nurses would be employable today since many would no longer be qualified or interested, while many others would have left the Province, retired, or become disabled or deceased. Also, many of these nurses could be inactive on a temporary basis for educational purposes or due to family circumstances and, hence, would not be in a position to return to work at the present time whatever incentives might be offered.

Because statistics are not available on the rate at which nurses change from inactive or lapsed status to active status, additions from this source will not be included in the supply projections. Conversely, the rate at which actively employed nurses change to inactive or lapsed status will also not be included in the loss projections due to a lack of usable data.

4.2.3 Summary.

In summary, then, the current requirements, based on effective demand, are for 2827 full-time equivalent registered nurses. The current supply meets the current requirements and comprises 4694 nurses:

Current Active Work Force - Full-Time	3198
Current Active Work Force - Part-Time	<u>1173</u>
Subtotal	4371
Nurses Seeking Employment	<u>323</u>
Total	<u>4694</u>

Inactive nurses, who are actively seeking employment but have not registered with the Canada Employment and Immigration Commission, are not included in these figures. In the author's opinion, these numbers would be small and can be disregarded for purposes of this analysis.

In terms of the formal manpower planning strategies outlined in Section 2.4.1, most of the material presented in this section, while derived from secondary sources, was based on either an Employer Survey or a Licensure Survey. The report Health and Social Service Manpower in Newfoundland and Labrador, 1982 (Department of Health, 1982) is an Employer Survey, while the report Registered Nurses in Newfoundland and Labrador, 1981 (Department of Health, 1983) is a Licensure Survey, based on the 1981 nurses' licence renewal form. These two documents provided most of the statistics for Tables 19 and 20.

4.3 Projected provincial requirements and supply

4.3.1 Projected requirements

Selecting the planning methods to be utilized in projecting future requirements is a difficult decision since no one method has proven to be universally applicable or error free. The decision is further complicated by the fact that several of the methods outlined cannot be utilized due to the unavailability or non-comparability of data.

Of the various requirements methodologies presented in Section 2.5.1, only two would be feasible for use in the research associated with this thesis. These two methods are (a) the Manpower/Population Ratio Method, and (b) the Budgeted Job Vacancies Method - the latter being a variant of the Health Demands Approach.

The reasons for rejecting the other methods are as follows:

METHOD

REASON FOR REJECTION

- | | |
|---|--|
| (1) Health Needs Approach | Requires very extensive data collection and analysis

Would be too costly and time consuming for a project of this nature |
| (2) Service Targets Approach | Requires very extensive data collection and analysis

Would be too costly and time consuming for a project of this nature |
| (3) Constant Utilization with Changing Population | Unavailability of utilization data for nursing homes and community health field |
| (4) Constant Utilization with Changing Population and Changing Income | Not relevant to the local situation due to universal health coverage |
| (5) Population and Income Method | Not relevant to the local situation due to universal health coverage |
| (6) The Industry-Occupational Matrix Method | Unavailability of an appropriate matrix for either Newfoundland or Canada |
| (7) Prepaid Group Plan Approach | Inappropriate for comparison with local situation due to universal health coverage and different economies, geography, and culture |

Before proceeding with the estimation of requirements based on the Manpower/Population Ratio and Budgeted Job Vacancy Approaches, discussion of the effects of changes in

four important variables will be presented. These variables are: (a) the construction/expansion of health care facilities, (b) the changing pattern of health care delivery, (c) major industrial reduction or expansion, and (d) demographic shifts in the population.

Construction/expansion of health care facilities

The nurse manpower requirements associated with the construction and expansion of health care facilities in the Province over the next five years are outlined in Table 23. As can be seen, 146 additional nurses will be required based on this variable. An assumption inherent in the use of these estimates is that the capital projects outlined will be completed on target.

Changing pattern of health care delivery - The pattern of health care delivery is constantly evolving due to rapid changes in medical science, increased technology, and improved computer hardware. These advances have led to the development of more specialized health services and the use of highly technical treatments and modes of care. Subsequent to these changes, hospitals are experiencing "shorter lengths of stay, greater acuity of illness, earlier discharge, day care surgery, and increased emphasis on outpatient, community health, and home care programs. (ARNN, 1982, p.54)."

TABLE 23 - PROPOSED CONSTRUCTION/EXPANSION OF:
HEALTH CARE FACILITIES AND ASSOCIATED
NURSE MANPOWER REQUIREMENTS 1983-1987

<u>Project</u>	<u>Target Dates</u>		New R.N. Posts Needed ^a
	<u>Start</u>	<u>Finish</u>	
<u>Hospital Construction</u>			
Channel	1980	1983	10
Clareville	1983	1986	25
Burin	1984	1986	25
Bonavista	1983	1984	10
<u>Hospital Expansion</u>			
Grand Falls	1984	1987	15
<u>Hospital Development/ Redevelopment</u>			
Miller Centre	1982	1984	10
Carbonear (8th Floor)	1983	1984	6
<u>Clinic Construction</u>			
Markland	1984	1984	-2
Black Tickle	1983	1984	1
Mary's Harbour	1983	1984	1
Fox Harbour/St. Lewis	1983	1984	1
Cartwright	1984	1985	1
<u>Nursing Homes/Homes for Special Care - Expansion</u>			
Harbour Lodge, Carbonear	1984	1984	6
Valley Vista, Springdale	1983	1984	3
St. Patrick's Mercy Home, St. John's	1983	1984	10
Bay St. George,			
Stephenville	1983-84	1984-85	12
Lakeside Homes, Gander	1983-84	1984-85	12
			<u>146</u>

^aThese are unofficial estimates only and are subject to funding being available.

Source: Government officials, July, 1983

Factors such as these have an impact on the role and function of nursing services. Generally, this impact is in the nature of increased demand for registered nursing staff with a lessening or maintenance of the status quo for auxiliary nursing personnel. Indeed, five provinces - Nova Scotia, New Brunswick, Ontario, Alberta and British Columbia - are now moving towards all registered nurse staffing in tertiary care centres and in selected units in referral acute care institutions.

Estimates were obtained from government officials on the anticipated increased demand for registered nurses in the Province over the next five years, taking the factors listed above into account and considering the possibility of changes in the proportion of registered nurses to nursing assistants. These estimates, which are merely approximations and subject to funding, show a need for an additional 175 nurses over the planning time frame.

Government's policy of no new expansion, no new posts and no new programs, except in cases of emergency, has changed somewhat (ARNN, 1982, p.48). Based on the fact that hospitals will soon be moving to a global system of financing, Department of Health officials have now commenced base organizational and operational reviews of the various hospitals throughout the Province and have indicated that, in areas where additional positions are recommended, funds will be forthcoming over a three-year period to implement them.

The changing roles of the Cottage Hospitals in the Province will lead to the placement of some of these institutions under regional hospital boards, while others will be converted to different purposes - e.g., health clinics. The nursing implications of these moves are incorporated into these projections. A thesis on the changing roles of Cottage Hospitals was recently completed at Memorial University (Dewling, Ruby Skinner. Utilization of Cottage Hospitals and Health Service Needs in Two Defined Districts, February 1983).

Major industrial reduction or expansion - The establishment or expansion of major industries in the Province could have an impact on the demand for health care and, thereby, for health manpower, primarily through industrial health problems such as asbestosis, and injuries. Also, a general increase in health care demand would occur if there was a large influx of people to a particular area of the Province as a result of industrial development.

It would seem, however, that the only major industrial development likely to occur within the planning time frame would be oil exploration off the Grand Banks. An Impact Study has been done by the Mobil Oil Group to determine the effect that full operation of the Hibernia Oil Field could have on the health care delivery system. The findings were that the present system could handle the anticipated demands that might be placed on it.

There will, however, be some demand for rig medics and for specialists (medical and nursing) in hyperbaric medicine, but these numbers would likely be small. Memorial University is currently making great progress in the development of its Telemedicine Program for use in bringing medical consultation to the oil rigs.

Perhaps a more pressing concern with regards to this variable is the possibility of shutdowns or cutbacks of some of the industries now in operation, particularly the mining industries. Such moves could virtually wipe out a town and lead to an oversupply of health personnel, and even closure of a health care facility, in a given area depending on the severity of the problem. An additional side effect of the high unemployment rates associated with such closures could be a significant increase in the utilization of mental health services. This would obviously impact on the requirements for nurses with specialty training in the mental health field.

Since very little hard data are available about the likelihood of industrial development or slowdowns over the next five years, no additions or subtractions will be made to manpower requirements based on this variable.

Demographic shifts in the population - Demographic changes in population structure can have a profound effect on the requirements for health manpower since the demand for health services, and thereby health manpower, varies

throughout an individual's life span. A case in point is the special needs of the elderly (ages 65 and over), and, as both Canada and Newfoundland have an aging population, this factor will, over the long term, have a major effect on the level and type of services demanded.

Statistics obtained from the report Canada's Population: Demographic Perspectives (Statistics Canada, 1979) show that the two most noticeable changes in the population of Canada over the period 1961-1976 were the declining proportions of young children (ages 0 - 5) and the growing proportions of elderly people (ages 65 and over). Young children comprised 14.7% of the total population in 1961, but, by 1976, their proportion had dropped to 9.2%. During the same time span, the proportion of elderly people increased from 7.6% to 8.7%. Indeed, the percentage of the population in the 65+ age bracket increased by 43.7% over the 15-year time span compared with a 26.1% increase in the general population over that same period.

Two important effects of the changing age structure are the reduction in the proportion of the population under 20 with its concomitant effect on educational institutions and the teaching profession and the large increase in the proportion of the population aged 65 and over (estimated to reach approximately 11.2% of the total population by the year 2001). The main implications of the aging of the

population will relate to retirement age policy, housing schemes, health care, old age pensions, and a wide range of other social and welfare programs.

Results of the 1978-79 Canada Health Survey (Health and Welfare Canada and Statistics Canada, 1979) and a comparison of various facets of it with the Canadian Sickness Survey of 1950-51 (National Health and Welfare and Dominion Bureau of Statistics, 1960) indicate that the health status of the population as a whole has remained relatively stable over the 28-year period (Government of Canada, 1982). Disaggregation of the data by 5-year age groupings, however, reveals major differences in the percentage occurrence of health problems:

While the prevalence of health problems appears to have increased slightly for the working age population (aged 15 - 64), the prevalence of health problems among children (aged 0 - 14) has declined by half, and, for those aged 65 and over, has risen by more than half. For both the young and the aged, the prevalence of long-term disability has remained constant. (Government of Canada, 1982, p.47)

Based on the statistics outlined, it would seem that the major additional requirements for health services would be for the elderly group. Additional statistics presented in the same report provide verification for this conclusion:

- (1) Annual bed days per person age 65 and over is 13.2 compared with 5.3 for the entire population.
- (2) Annual disability days experienced by the aged are 35 compared with 15.7 for the population as a whole.

- 3) While the elderly constitute 9.5% of the total population, they utilize about 35% of the patient days in general and allied special hospitals, and their average length of hospital stay is more than twice as long as that of other age groups. (p.45)

Newfoundland's projected population by age group for the years 1983 and 1987 is outlined in Table 24. The most notable changes over the five-year period are the declining percentage of children (aged 0 - 14) and the growing percentage of working age individuals (aged 15 - 64) in the population. It is estimated that the percentage of children in the population will decline from 28.2% in 1983 to 26.0% in 1987, while the percentage of working age individuals will increase from 63.7% to 65.0% over the same period. The percentage of the elderly, while increasing over the five-year time span, is not expected to undergo as large a change as the other two groups. The percentage increase, according to the projection, will be 0.9%.

Application of the national health statistics to the local scene and the planning time frame of the thesis suggest that, while the changing age structure of Newfoundland's population will have some impact on the requirements for health services, the effects will not be

TABLE 24 - PROJECTED POPULATION BY
AGE GROUP FOR NEWFOUNDLAND
1983 AND 1987
(,000)

Age	Population			
	1983		1987	
	Count	%	Count	%
0-4	48.8	8.5	48.9	8.4
5-9	53.0	9.2	47.9	8.2
10-14	60.0	10.5	54.7	9.4
15-19	60.1	10.5	53.7	9.2
20-24	49.9	8.7	49.3	8.4
25-29	50.1	8.7	47.7	8.2
30-34	47.7	8.3	52.1	8.9
35-39	39.5	6.9	46.2	7.9
40-44	29.1	5.1	37.2	6.4
45-49	24.2	4.2	27.4	4.7
50-54	23.2	4.1	23.8	4.1
55-59	21.1	3.7	22.1	3.8
60-64	20.4	3.6	19.9	3.4
65-69	17.1	2.9	18.5	3.2
70-74	12.2	2.3	15.0	2.6
75-79	7.8	1.4	10.2	1.7
80-84	4.8	0.8	5.3	0.9
85-89	2.4	0.4	2.6	0.4
90+	1.1	0.2	1.2	0.2
Total	573.4	100.0%	583.8	100.0%
0-14	161.8	28.2%	151.6	26.0%
15-64	365.1	63.7%	379.4	65.0%
65+	46.5	8.1%	52.8	9.0%

Note: Based on population projections obtained from the Newfoundland Statistics Agency. Those projections (#82.7 - Most Likely) were one of a series of special tabulations produced by Statistics Canada for the agency. Based on the 1981 Census, they incorporated a 2.1 to 1.9 fertility rate and a net migration rate of -4000/year to -2000/year for the years 1981 to 2001.

major over the planning period. This is due to the short time span (five years) and the relatively small increase in the elderly population over that time period.

Other variables - Other variables, such as changing lifestyles and increased emphasis on industrial health and participation, will all have some impact on nurse manpower requirements. Since these effects are very difficult to quantify and since the anticipated requirements would likely be only small in the short term, they will be ignored for purposes of this analysis.

Projected requirements based on the Budgeted Job Vacancies Approach - Due to the availability of data from secondary sources, a survey of employers was not conducted.

The projected need for new registered nurse positions in the Province over a two-year period is included in the report Health and Social Service Manpower in Newfoundland and Labrador (Department of Health, 1982). Results of that survey, as presented in Table 25, were that the employing agencies (see Appendix A for listing and categorization) were projecting a need for an additional 215 nurses over the period 1983 and 1984. 73.5 (34.3%) of these positions were needed due to increased levels of care, while 97 (45.2%) were required on the basis of new service, opening new beds, or expansion of service combined.

TABLE 25
EMPLOYERS' PROJECTED NEEDS FOR NEW NURSING POSITIONS
1982-1984

<u>Reason for New Positions</u>	<u>Type of Employing Agency</u>				
	<u>General Hospital</u>	<u>Government Hospital</u>	<u>Nursing Home</u>	<u>Other</u>	<u>Total</u>
Increased Level of Care	48.0	0.0	25.5	0.0	73.5
New Service	6.0	0.0	0.0	0.0	6.0
Opening New Beds	49.0	0.0	11.0	0.0	60.0
Expansion of Service	11.0	0.0	19.0	1.0	31.0
Other	15.0	0.0	0.0	0.0	15.0
Not Specified	<u>21.0</u>	<u>0.0</u>	<u>8.0</u>	<u>0.0</u>	<u>29.0</u>
Total	<u>150.0</u>	<u>0.0</u>	<u>63.5</u>	<u>1.0</u>	<u>214.5</u>

Note: There were 2827 established nursing positions at the time of this survey.

Note: A two-year projection period was used in this survey because very few of the agencies have made long-term plans and most would be unable to predict their needs with any degree of accuracy beyond a two-year period. It was felt by Newfoundland Hospital Association officials that asking for projections beyond the two-year time frame would have a significant negative effect on overall response to this section of the survey instrument.

Source: Department of Health, Health and Social Service Manpower in Newfoundland and Labrador, 1982. St. John's, 1982.

The shortness of the projection period associated with that study is a limitation insofar as the analysis being conducted for this thesis is concerned. An attempt was made to come to terms with this limitation by comparing the projections made in that report with the estimated requirements made by government officials (on the basis of the construction and expansion of health care facilities) over the five-year planning time frame as presented in Table 23.

The results showed that there were wide variations between the two estimates. According to Table 23, the nursing requirements associated with the capital projects expected to be completed in 1983 and 1984 are as follows:

General Hospitals	16
Government Hospitals	10
Nursing Homes	29 (2 + 24)
Other (clinics)	<u>1</u>
Total	56 (780)

This compares with the projections made by employing agencies under the following reasons - new service, opening new beds, and expansion of service:

General Hospitals	66
Government Hospitals	0
Nursing Homes	30
Other	<u>1</u>
Total	97

For purposes of this analysis, government's estimates of requirements based on the construction/expansion of health care delivery and the changing patterns of health care will be used to determine requirements under the Budgeted Job Vacancies Approach. This decision was premised on the following facts and assumptions:

- (1) The employers' projections only covered a two-year time frame and, while there may have been some degree of overprojecting on certain variables, most employers would undoubtedly identify additional requirements to cover the other three years in the planning time frame.
- (2) The unofficial estimates given by government staff cover the full five years and could be said to include the figures projected by the employing agencies in most cases.
- (3) Government officials may tend to give lower estimates overall than employers, given their proximity to and responsibility for working within the fiscal restraint program. Their projections, therefore, may come closer to what is necessary for satisfactory patient care than what is needed for ideal staffing patterns. This ties in well, however, with the

The nursing homes and "other" employing agencies' projections match well. However, the government operated hospitals did not project any increased need for registered nurses due to the anticipated opening of Bonavista Hospital in 1984, and the general hospitals projected well beyond the government estimates. The extent of the latter disparity is difficult to understand since only two general hospitals, Channel and Carbonear, are targeted to have any new beds open during the two-year period. This disparity may represent response error in the categorization of the reasons for the new posts, or it may reflect the employer's perception of ideal staffing requirements. While such projections may indeed represent very desirable staffing patterns, they may also be well beyond what government would be in a position to fund. Given that the Budgeted Job Vacancies Method is a variant of the Health Demands Approach and is, therefore, predicated on the concept of economic (effective) demand, the employer's projections should, therefore, be viewed with some caution.

A comparison cannot be made between government's and the employing agencies' perceptions of new posts needed due to increased levels of care for two reasons. First of all, government's estimate (175 nurses) is incorporated in the needs generated by the changing pattern of health care delivery and, secondly, it covers the total planning time frame without yearly stratification.

economic (effective) demand philosophy of the Budgeted Job Vacancies Approach. Any projections made using this approach should incorporate requirements generated by these two variables, particularly the requirements associated with the construction of new hospitals, etc., since they would by definition be excluded from a survey of employers.

Table 26 presents the projected requirements based on the Budgeted Job Vacancies Approach, taking the aforementioned factors into account. As can be seen, the projected nurse manpower requirements in 1987, based on this approach, will be 3148 full-time equivalent nurses.

TABLE 26 - PROJECTED NURSE MANPOWER
REQUIREMENTS IN 1987 BASED ON THE
BUDGETED JOB VACANCIES METHOD

<u>Source</u>	<u>Positions</u>
Current Requirements	2827
Construction/Expansion of Health Care Facilities	146
Changing Pattern of Health Care Delivery	<u>175</u>
	<u>3148</u>

Note: These projections refer to full-time equivalent positions.

Projected requirements based on the Manpower/Population Ratio Approach - The use of a manpower population ratio for estimating registered nurse requirements is of questionable value. Nurses are not independent practitioners, and they form only one part of the total nursing manpower group in which ratios of nurses to nursing assistants fluctuate according to the type of hospital, change in the levels of care, increased technology, etc. In spite of these factors, however, projected requirements were derived for comparative purposes using this approach.

Attempts to obtain a recommended nurse/population ratio were unsuccessful. Ratios presented in the Canada Health Manpower Inventory 1981 (Statistics Canada, 1982) were not usable because (a) they were based on nurses' licensure data, (b) they represented both full-time and part-time employment but were not translated into full-time equivalent positions, and (c) they were developed using only the number of nurses who registered during the first few months of the registration renewal period and, hence, would not be comparable with ratios developed using a full year's registration statistics.

The ratio chosen for use for this analysis was the current ratio based on the number of established F.T.E. registered nurse positions in the Province. Assumptions

inherent in the use of this ratio are that the current ratio is suitable for the future and that the changes in the size of the population over the next five years will require an equally proportionate change in the number of nurses needed to provide a satisfactory level of health care.

The estimated requirements were computed as follows:

Current Status = $\frac{2827 \text{ F.T.E. nurse positions}}{573,400 \text{ population}}$
(1983)

Current Ratio = 1 nurse (F.T.E.) per 203 population

Future Requirement = $\frac{585,900 \text{ population}^a}{2886 \text{ nurses}}$
(1987)

^aBased on population projection 82.7 (see footnote - Table 24)

The very limited change in requirements, an additional 59 nurses, over the planning time frame demonstrates the major problem associated with the use of this approach for nursing personnel. The two major factors contributing to increased requirements for nurses in the Province - i.e., construction and expansion of health care facilities and changing patterns of health care delivery - are totally ignored, thereby invalidating the method for use with nurse manpower planning in this Province.

Some statistics presented in the Nurse Manpower Report (ARNN, 1982) demonstrate further the unrealistic

results that can be obtained using this approach. In that report, an analysis was made of the change in demand over the previous five years. The findings were that, over the five-year period, there was an increase of 1029 (56%) approved registered nurse positions in the Province.

This increase in approved positions improved the nurse population ratio from 1:305 in 1976 to 1:199 in 1981 (pp. 22-26). Had manpower forecasts been made in 1976 using the current ratio to project future supply, the estimated requirements would have been for 1861 nurses (an additional 33 positions), a far cry from the 2857 positions that were actually approved by the end of that five-year period.

The use of a more sophisticated ratio such as the ratio in existence in a better served area, or one derived by professional judgement, might improve the estimates somewhat, but the problem of not accounting for the two main variables would still exist.

A final point of note is that the inherent assumption that the current ratio is suitable for the future may not be reasonable due to the tight fiscal restraint program in effect. It would seem that the current staffing patterns, while providing adequate coverage at present, would be enlarged in most areas to allow more flexibility if funds were to become available.

4.3.2 Projected supply

As indicated in Section 2.4.2, projected health manpower supply is made up of current supply plus increments and minus losses. Each of these elements will be estimated separately and then aggregated to obtain the total supply projection. Given the availability of usable data, secondary sources were, in most cases, utilized to obtain the required statistics.

Current supply

The current active supply of nurses in the Province, as demonstrated in Section 4.2.2, is 4694 comprising 4371 nurses with active licences, 1173 of whom work part-time, and 323 nurses registered with the various Canada Employment Centres in the Province as seeking employment.

Increments

The increments to supply are made up of inflows from new graduates and geographic and occupational transfers.

New local graduates - Projected inflows to the registered nurse work force from new graduates of Schools of Nursing within the Province are outlined in Table 27. The basic assumptions used in the development of this table are

- (a) Government will continue to finance the five Schools of Nursing now in operation in the Province, and no new schools will come into existence

TABLE 27 - PROJECTED OUTPUT OF NURSING SCHOOLS IN NEWFOUNDLAND, 1983-1987

<u>B.N. Students</u>				<u>Diploma Students</u>				<u>All Students Combined</u>	
<u>Admissions</u>		<u>Graduations</u>		<u>Admissions</u>		<u>Graduations</u>		<u>Anticipated Graduates</u>	
<u>(a)</u>		<u>(b)</u>		<u>(c)</u>		<u>(d)</u>		<u>(b)+(d)</u>	
<u>Year</u>	<u>#</u>	<u>Year</u>	<u>#</u>	<u>Year</u>	<u>#</u>	<u>Year</u>	<u>#</u>	<u>Year</u>	<u>#</u>
1979	42	1983	28	1980	400	1983	268	1983	296
1980	27	1984	18	1981	396	1984	265	1984	283
1981	46	1985	31	1982	383	1985	257	1985	288
1982	56	1986	38	1983	330	1986	221	1986	259
1983	70	1987	47	1984	330	1987	221	1987	268
Total Graduates:		162				1232		1394	

Note 1: An attrition rate of 33% has been applied to all classes.

Note 2: The diploma schools are not anticipating any cutback in enrollment due to the implementation of Grade XII into the high school system in 1983. The decrease in enrollment is due to spacing problems as a result of the large class intakes in 1982.

Note 3: The statistics from the University School of Nursing are separated from the diploma schools because the university program is of four years' duration compared with 2½ to 3 years for the diploma schools. Students who entered the Memorial program will, therefore, graduate one year later than their contemporaries in diploma schools.

Memorial University School of Nursing will not be affected by the implementation of Grade XII until 1984 because students are not accepted into the Nursing program until they have completed one year of Junior Studies.

Source: ARNN Annual Statistics

- (b) the class sizes for the diploma School of Nursing in 1983 and 1984 will be as follows:

S.A. Grace General Hospital School	85
General Hospital School	85
St. Clare's Mercy Hospital School	80
Western Memorial Hospital School	80

- (c) the class size for Memorial University School of Nursing will be 70 in 1983 based on the number of first year students accepted by the School as of mid-August, 1983

- (d) the attrition rates for all classes and programs will average 33% each year

As evidenced in Table 27, 1394 nurses can be expected to graduate within the Province over the next five years. It is estimated that 98% of these graduates (1366) will commence active practice in the Province within the year following their graduation.

Geographic transfers - An average of 147 nurses from other provinces and countries have actively registered (and thereby received a current licence to practise) with the nursing association annually over the past five years (see Table 28). Using the average annual inflow rate of 147 as a

constant, 735 new entrants to the work force can be expected from out-of-area inflows over the five-year projection period.

While these statistics are somewhat limited by the unavailability of information concerning the number of out-of-province nurses who renew their licences each year after a period of lapsed membership, they will be used as a basis for estimating geographic transfers. It is felt by local nursing authorities that the annual number of such renewals is small. Therefore, it will be disregarded for purposes of this analysis.

TABLE 28

NEW OUT-OF-PROVINCE REGISTRANTS
WITH THE ARNN, 1978-1982

	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Canadians	59	103	82	74	68
Non-Canadians	<u>57</u>	<u>46</u>	<u>76</u>	<u>81</u>	<u>88</u>
	<u>116</u>	<u>149</u>	<u>158</u>	<u>155</u>	<u>156</u>

Note: Refers only to nurses who trained outside the Province and who are registering in this Province for the first time. Nurses who are re-entering after a period of absence are not included in these figures.

Source: ARNN Annual Statistics

3

Occupational transfers - Due to data deficiencies, it is impossible to determine the number of increments to the nursing work force based on occupational transfers. Since licensure requirements demand the completion of a formal nursing education program, the only people who could transfer into nursing from other occupations would be nurses previously licensed who had since taken up some other occupation. Since the number of occupational transfers would be very small, it is ignored in this analysis.

Losses

Outflows from the stock of annual supply stem from deaths, retirements (temporary and permanent), and occupational and geographic transfers.

Deaths - Abridged life tables obtained from Statistics Canada will be utilized to project the losses to the nursing work force due to deaths. Since the most recent Canadian life tables published were based on the period 1975-1977, these tables will be used as proxy time data.

An assumption inherent in the use of life table statistics is that the mortality rates provided in the tables are appropriate for the planning time frame and for the nursing group. In other words, it is assumed that (1) no major changes such as wars or life-extending medical advances will occur that would affect the death rates over the projection period, and (2) the mortality rates of the current nursing work force will parallel those of the population used to derive the life tables.

Table 29 presents the estimated losses from nursing supply due to deaths. As can be seen, the estimated loss to the nursing work force over the next five years due to this cause will be 26. For projection purposes, these deaths will be evenly distributed over the five-year time frame - i.e., five deaths per year from 1983 to 1986 inclusive and six deaths in 1987 (see Table 33).

Retirements - Losses due to permanent retirements from the nursing work force will be based on the number of nurses currently in the work force who are in the 60 and over age group. Again, the 1981 age groupings are used as a proxy time measure.

As evidenced in Table 30, there are 102 active nurses in this age group (2.5% of the active work force). All of these nurses are either at retirement age or will

TABLE 29 - ESTIMATED LOSSES FROM NURSING
SUPPLY DUE TO DEATHS, 1983-1987

Age Group	1983 Supply ^{a,b}	Female Mortality Rate (proportion)	1987 Attrition
Under 25	826	.0018471	2
25 - 29	1058	.0023280	2
30 - 34	705	.0023702	2
35 - 39	566	.0051468	3
40 - 44	377	.0077142	3
45 - 49	245	.0130181	3
50 - 54	166	.0210699	3
55 - 59	86	.0314780	3
60+	102	.0522466	5
All Ages	4131		26

^aIn developing these projections, it is assumed that all the nurses under 20 fall in the 20 - 25 age group and that all the nurses over 60 fall in the 60 - 65 age group.

^bDue to the unavailability of more recent statistics, 1981 age levels are used as proxy data for 1983 levels.

^cFemale mortality rates were selected since the nursing population is 98.8% female.

Sources: Statistics Canada, Life Tables, Canada and Provinces, 1975-77, Ottawa, 1979 (abridged life table for Newfoundland obtained directly from Statistics Canada)

Department of Health, Registered Nurse Manpower in Newfoundland and Labrador, 1981, St. John's, Government Printing Office, 1983

Association of Registered Nurses of Newfoundland Annual Statistics

TABLE 30

AGE GROUP BY REGISTRATION STATUS OF
ALL NURSES REGISTERED WITH THE ARNN
WHO WERE RESIDING WITHIN THE PROVINCE, 1981^a

<u>Age Group</u>	<u>Registration Status</u>		<u>Total</u>
	<u>Active Count</u>	<u>Inactive Count</u>	
Age Not Specified	0	2	2
Under 25	826	11	837
25 - 29	1058	58	1116
30 - 34	705	57	762
35 - 39	566	42	608
40 - 44	377	26	403
45 - 49	245	19	264
50 - 54	166	10	176
55 - 59	86	11	97
60+	<u>102</u>	<u>41</u>	<u>143</u>
	<u>4131</u>	<u>277</u>	<u>4408</u>

^a 313 nurses were registered with the association (91 active and 322 inactive) who indicated their place of residence was outside the Province. The active nurses in this group would include those employed with the Canadian Armed Forces and Health and Welfare Canada, as well as nurses living outside the Province but planning to return to active work in the Province in the immediate future.

Source: Department of Health, Registered Nurse Manpower in Newfoundland and Labrador, 1981, St. John's; Government Printing Office, 1983, p.2

reach it within the planning time frame. For projection purposes, the total loss will be spread fairly evenly over the five-year period - i.e., 21 retirements per year in 1983 and 1984 and 20 retirements per year in 1985, 1986, and 1987 (see Table 33).

Sources of temporary retirements or withdrawals from the labor force include short and long term illnesses, maternity leave, and leave for educational purposes (post basic courses, university degrees, etc.). While some data are available on the latter two of these factors, it is not sufficiently comprehensive or reliable for use in projecting nursing supply over a five-year time span. At any rate, most of these losses would indeed be temporary varying from four months to two years and would not affect the total supply at the end of the planning time frame. Losses from these sources, therefore, will not be included in the supply projection.

Geographic transfers - The rate at which nurses leave the Province and seek employment or continue their education (primarily Masters and Doctorate degrees) elsewhere is difficult to determine. The only information available for use in analyzing this variable are the statistics compiled annually by the ARNN on the number of out-of-province requests for verification of individual nurse's initial and/or current registration with that association.

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The verification figures provide a good estimate of the number of nurses seeking employment in other provinces since most provinces require that all nursing staff be registered in their area and that requirement generally entails verification of original and/or most recent nursing registration. Some provinces allow nurses to work as "graduate nurses" if they have been registered elsewhere without having their registration verified, but nurses working with that designation do not receive the same salary levels as registered nurses. Therefore, most individuals do have their registration verified.

Table 31 demonstrates that approximately 300 requests for verification were received by the ARNN annually for the past five years. As indicated in the table, these figures do not represent a total loss from the active nursing work force each year since not all of these nurses held active licences in the Province in the year in which their request for verification was received.

Table 32 provides a breakdown of the year in which the nurses, whose registration was verified in 1981 and 1982, had last held an active licence in the Province. As can be seen, approximately 57% of the 1981 and 1982 verifications belonged to nurses who were active in this Province at some time during their year of verification.

TABLE 31

VERIFICATION REQUESTS RECEIVED BY THE ARNN
FOR NURSES' ORIGINAL AND/OR CURRENT LICENSURE
IN THIS PROVINCE
1978-1982

<u>Year Request for Verification was Received</u>	<u>Place of Graduation of Nurses Whose Registration was Being Verified</u>		<u>Total^a</u>
	<u>Newfoundland Graduates</u>	<u>Out of Province Graduates</u>	
1978	192	44	236
1979	235	55	290
1980	279	77	356
1981	241	98	339
1982	<u>230</u>	<u>96</u>	<u>326</u>
Total	<u>1177</u>	<u>370</u>	<u>1547</u>

^aNot all of these nurses held an active licence in Newfoundland during the year in which the request for verification was received. Therefore, it is not known how many left the active nursing work force in Newfoundland each year.

Source: ARNN Annual Statistics

TABLE 32 - YEAR LAST ACTIVE NEWFOUNDLAND LICENCE WAS HELD BY
NURSES WHOSE REGISTRATION WAS VERIFIED IN 1981 AND 1982

<u>1981 Verifications</u>		<u>Year Last Active Licence Was Held</u>						
<u>Place of Graduation</u>	<u>Total</u> <u>Verifications</u>	<u>1981</u>	<u>1980</u>	<u>1979</u>	<u>1978</u>	<u>1977</u>	<u>1976</u>	<u>1975 &</u> <u>Prior</u>
Newfoundland	241	139	43	16	4	7	6	26
Out-of-Province	98	59	23	3	3	2	1	7
Total	339	198	66	19	7	9	7	33

<u>1982 Verifications</u>		<u>Year Last Active Licence Was Held</u>						
<u>Place of Graduation</u>	<u>Total</u> <u>Verifications</u>	<u>1982</u>	<u>1981</u>	<u>1980</u>	<u>1979</u>	<u>1978</u>	<u>1977</u>	<u>1976 &</u> <u>Prior</u>
Newfoundland	230	113	53	10	9	8	6	31
Out-of-Province	96	67	11	2	4	3	1	8
Total	326	180	64	12	13	11	7	39

Note 1: 1981 and 1982 were the only years for which these statistics were compiled by the ARNN.

Note 2: Interpretation Example: Of the 241 Newfoundland graduates who had their registration verified during 1981, 139 were holding an active licence in Newfoundland (and hence were practising as a nurse in Newfoundland during some part of 1981); 43 had last held an active licence here in 1980, 16 in 1979, four in 1978, seven in 1977, six in 1976, and 26 in or prior to 1975.

Source: ARNN Annual Statistics

Two additional limitations associated with the use of these data are that:

- (1) there may be more than one request for verification per nurse since a nurse could have applied to more than one province for work and licensure;
- (2) nurses whose registrations are verified do not necessarily move out of the province in that calendar year, if at all.

Taking all the above factors into account, an annual outflow of 150 nurses, one-half of the annual verification, will be incorporated into the supply projections to account for this source of loss.

Occupational transfers - Data deficiencies make the estimation of losses due to occupational transfers very difficult.

The ARNN (1982) suggests that, while there are indications that an increasing number of nurses are changing careers, there is little hard data on the extent to which this is occurring. Other fields in which nurses are pursuing careers are identified as real estate, insurance, day care centres, merchandising, and medical research. The main reasons suggested for these occupational transfers were (a) changing societal values which offer women (both pre-nursing and post-graduation) a wide range of career opportunities as opposed to the old nurse-teacher-secretary syndrome, and (b) an unwillingness on the part of many of today's women to pursue careers which require "hard physical work with weekend and shift rotations in a position with a high stress factor."

(pp. 69-70)

It would seem that, given the current supply situation (in which many students of the 1983 graduating classes do not have and are not likely to obtain employment in the Province within a short time following graduation), the number of nurses switching to other occupations will perforce increase, assuming, of course, that positions in other fields will be available. These career changes would probably only be temporary, however, since most of these individuals would, in all likelihood, switch back to their nursing careers as permanent nursing jobs become available.

Given the data deficiencies, estimation of outflows due to occupational transfers will not be included in the supply projections. However, this counterbalances the decision not to include inflows due to occupational transfers. Thus, regardless of the numbers involved, the net result is a putative 0.

Aggregate supply projection - Table 33 presents an aggregate supply projection. The final estimates are that nurse manpower supply in 1987 will total 5917 nurses.

For comparative purposes, an estimation of the total nursing supply was prepared using trend analysis of the annual supply of active nurses over the period 1977 - 1982. The supply of active nurses for the years 1977 - 1982 is drawn from Table 21, page 90. The supply of active

TABLE 33 - PROJECTED SUPPLY OF REGISTERED
NURSES IN NEWFOUNDLAND 1983-1987

Source of Supply	Year					
A. Current Supply	1983					
Active Work Force						
- Full Time	3198					
- Part Time	1173					
Subtotal	4371					
Seeking Employment	323					
Total	4694					
B. Increments	1983	1984	1985	1986	1987	Total
New local graduates ^a	290	277	282	254	263	1366
Geographic transfers ^b	147	147	147	147	147	735
Occupational trans- fers	0	0	0	0	0	0
Total	437	424	429	401	410	2101
C. Losses	1983	1984	1985	1986	1987	Total
Deaths	5	5	5	5	6	26
Retirements	21	21	20	20	20	102
Geographic transfers	150	150	150	150	150	750
Occupational trans- fers	0	0	0	0	0	0
Total	176	176	175	175	176	878

Aggregate Supply Projection for 1987

Current Supply (1983)	4694
Increments	+2101
Subtotal	6795
Losses	- 878
Total	5917

^aCalculated using a 98% retention rate annually.

^bIncludes new out-of-province graduates only.

^cDue to data deficiencies, increments and losses from this source are not being incorporated into the supply projections. It is felt that the numbers are sufficiently small that such an omission will not seriously affect these projections.

nurses in 1976 (3347) was obtained from the ARNN annual statistics.

The annual average growth in the number of active nurses was computed using a linear model, $Y = a + bx$ (see Appendix B for detailed calculations). The trend equation with 1979 as the year of origin is

$$Y = 3,892.7 + 169.9x$$

The projected annual supply to 1987 using this equation is

1983	4572.3
1984	4742.2
1985	4912.1
1986	5082.0
1987	5251.9

Adding the 323 nurses currently seeking employment to this total would give a final figure of 5,574.9, compared with the projection (5,917) derived from using the other approach (current supply plus increments minus losses).

The disparity between the two results can be accounted for by the mere fact of using different approaches. It would seem that the first approach would give a more precise forecast since it accounts for all the individual increment and loss components separately. Trend analysis is a good measure to use when detailed information is not available regarding the separate components. It must be borne in mind, however, that the pattern exhibited in the past will not necessarily be replicated in the future and,

therefore, may provide a poor basis for projecting either supply or requirements.

4.3.3 Summary

In summary, then, the projected requirements for registered nurses, developed utilizing two different methodological approaches, gave widely divergent results:

Budgeted Job Vacancies Method	- 3148 F.T.E. positions
Manpower Population Ratio Method	- <u>2886</u> F.T.E. positions
Difference	- <u>262</u>

Of the two approaches, the Budgeted Job Vacancies Method seemed to give the most realistic projection as a result of specific consideration of the effects of changes in two major variables.

The projected supply of registered nurses, also developed using two different approaches, gave different results:

Aggregate Supply Projection	- 5917 nurses
Trend Analysis	- <u>5575</u> nurses
Difference	- <u>342</u>

These supply projections relate to the number of active nurses, of course, and do not account for their level of participation in the labor force (in terms of full-time equivalent employment). In order to accommodate this factor, a comparison was made of the number of nurses actively

registered with the ARNN (and, therefore, actively employed in the Province) for the past three years as well as with the provincial nurse manpower requirements (in terms of full-time equivalent employment) as identified in the annual inventories of health and social service personnel (see Table 34).

TABLE 34 - TRANSLATION OF NURSING SUPPLY
INTO NURSING REQUIREMENTS

<u>Year</u>	<u>Nurses with Active Licences</u>	<u>Established Nursing Positions (F.T.E.)</u>	<u>Ratio</u>
1980	4087	2713	1.51
1981	4228	2801	1.51
1982	4371	2827	1.55

Sources: Department of Health, Health and Social Service Manpower in Newfoundland and Labrador, 1980, 1981 & 1982, St. John's

ARNN Annual Statistics

Application of this ratio to the projected supply figures shows that projected supply would more than equal projected demand using either of the supply projections:

Aggregate Projection $5917 \div 1.5 = 3945$ F.T.E.

Trend Analysis $5575 \div 1.5 = 3717$ F.T.E.

This assumes, of course, that the 1:5 ratio will hold.

The figures suggest also that there will be a surplus of nurses:

	<u>Budgeted Job. Vac.</u>	<u>Man./Pop.</u>
Projected Requirements (F.T.E.)	3148	2886
	<u>Aggregate</u>	<u>Trend Analysis</u>
Projected Supply (Total)	5917	5575
(F.T.E.)	3945	3717

It is impossible to state definitively, however, that a surplus will exist for two reasons:

- (1) the labor force participation rates of women are subject to wide variations as many of the nurses projected to be available in the Province may elect to (a) not seek employment, (b) pursue their education on a full-time basis, (c) change careers, or (d) withdraw temporarily from the workforce while they raise small children, and
- (2) the trend towards part-time employment has increased very significantly in the past five years (from 17.9% in 1978 to 26.8% of total active registrants in 1982). If this trend continues, it would mean that more nurses (than the 1.5 ratio of the past three years) would be needed to fill the projected full-time equivalent positions.

The likelihood of a large increase in the rate of part-time employment does not seem to be great, however. Opinions expressed by several of the Directors of Nursing of the Province's larger hospitals are that the rate of part-time employment would be more likely to remain stable or decline than to increase over the next five years. The Directors expressed the concern that heavy reliance on part-time personnel can have a negative effect on the quality of patient care due to a lack of continuity and that, in most instances, they would hire full-time personnel if they were available.

It is important to bear in mind, also, that the supply and requirement estimates derived in any study are, in large part, determined by the planning methodology chosen. This point is corroborated by Lee Hansen's findings on physician manpower projection techniques. Hansen (1970) reports on six studies conducted in the United States prior to 1970 which estimated physician requirements for 1975. The requirements estimates derived from these studies, all of which used different methodologies, varied significantly, ranging from 305,000 to 425,000. In addition, opposing conclusions about the adequacy of projected physician supply were drawn from the different studies. (pp. 102-113)

5.0 SUMMARY AND CONCLUSIONS

5.1 Summary

The material presented in the first two sections of this thesis illustrates the scope, context, and hazards of the health manpower planning process. The ultimate goal of this process is aptly described by Hall & Mejia (1978) as that of designing and implementing manpower plans and programs responsive to the health care needs of the people and their demand for services, while, at the same time, ensuring that health services are adequately staffed in all geographical regions and settings and that health personnel can work effectively (p.37).

The specific objectives and strategies that can be utilized to achieve this goal are outlined in Table 35. Taken from Hall & Mejia (1978), this table presents a very clear and concise view of the overall health manpower planning process and serves as a good final summation of it (p.36).

Sections 3.0 and 4.0 dealt with the health manpower planning process in the context of the Newfoundland health care system. Section 3.0 summarized the major health manpower planning activities in the Province to date, based mainly on employer surveys and the informal use of expert opinions of requirements. Section 4.0 attempted to apply the various formal manpower planning strategies to the local nurse manpower situation.

TABLE 35

THE SCOPE OF THE HEALTH MANPOWER PROCESS		
OVERALL AIM: TO ENSURE THE MANPOWER NEEDED BY THE HEALTH CARE DELIVERY SYSTEM		
GOAL	HEALTH MANPOWER PLANNING TO PROVIDE THE FRAMEWORK WITHIN WHICH THE HEALTH MANPOWER PROCESS TAKES PLACE	HEALTH MANPOWER PRODUCTION TO PROVIDE THE MANPOWER REQUIRED BY THE HEALTH MANPOWER PROCESS
	HEALTH MANPOWER MANAGEMENT TO OPTIMIZE THE USE OF HEALTH MANPOWER	
OBJECTIVE	TO SPECIFY THE NUMBER OF TEAMS AND THE COMPOSITION NEEDED TO IMPROVE THE LEVEL OF HEALTH UP TO A PROPOSED LEVEL	TO PRODUCE X PEOPLE OF Y TYPES
STRATEGY	REGIONAL (SUB-NATIONAL) PLANNING AND LOCAL PROGRAMMING-HEALTH MAN- POWER PROJECT FORMULATION, AND AGGREGATION, RECONCILIATION, AND CONSOLIDATION	REORGANIZATION - REGIONALIZATION - INTEGRATION OF PREVENTION AND CURE - COUNTRY HEALTH PROGRAMMING, - PRIMARY HEALTH CARE - HEALTH MANPOWER PROJECT MANAGE- - MENT
ACTIVITIES	PLANNING AND PROGRAMMING COORDINATION MONITORING AND EVALUATING. IMPLEMENTATION RESEARCH AND DEVELOPMENT	ESTABLISHMENT AND IMPLEMENTATION OF - SUPERVISION SYSTEM - REFERRAL SYSTEM - CONTINUING EDUCATION - RECRUITMENT AND SELECTION PRO- - CEDURES - CAREER DEVELOPMENT SCHEMES - DEPLOYMENT OF MANPOWER - STAFFING PATTERNS
TARGETS	X HEALTH TEAMS OF Y COMPOSITION IN OPERATION BY TIME T	X UNITS OF SERVICE OF SPECIFIED QUALITY DELIVERED TO DEFINED POPULATION - COVERAGE

SOURCE: PEJIA, A. (1978): "THE HEALTH MANPOWER PROCESS", IN HALL AND PEJIA (ED.) HEALTH MANPOWER PLANNING, WHO, GENEVA, P. 50.

While actual surveys and inventories were not carried out due to the availability of material from secondary sources, the usefulness of the different approaches was able to be evaluated based on the information obtained from each source.

5.2 Conclusions

It is the opinion of the author that the employer survey (Table 1) is an effective method for estimating current requirements and supply insofar as the filling of the required full-time equivalent positions is concerned. The licensure survey (Table 2) provides very reliable information about the numbers and characteristics of licensed individuals who are employed, but, since it does not account for personnel working part-time or, as in this Province, only accounts for part-time personnel without attention to their working hours per week, it cannot really stand on its own as a useful supply measure. A good estimate of the total supply picture can be obtained when both an employer and a licensure survey are used together.

The inventory of educational institutions is a very valuable tool for determining current and projected output of local education programs. I do not feel, however, that it should be used as the sole basis for projecting future supply as Kriesberg (USDHEW [HRA] 76-14512, 1976) suggests (Table 3) since it ignores too many important variables, most notably the re-entrance of inactive personnel to the workforce.

A wide variety of formal manpower planning techniques (as outlined in Section 2.0) were available for use in projecting both current and future supply and demand. It was the intent of the author to apply most, if not all, of these techniques to the Newfoundland situation in order to test their validity and usefulness for local planning activities. While many of the techniques were utilized, primarily through secondary data, application of several of the approaches had to be deferred or rejected due either to limited financial, time or human resources or to the non-applicability of some of the approaches in this Province given the current method of financing health care.

In brief, the methods which were tested were:

Current requirements:	employer and licensure surveys
Current supply:	employer and licensure surveys inventory of educational institutions
Projected requirements:	Professional judgements Budgeted Job Vacancies Approach Manpower/Population Approach
Projected supply:	licensure survey inventory of educational institutions computation of new licentiates life tables trend analysis

The computation of new licentiates (Table 4) would also be a useful method for projecting future supply but only if it was based on the issuance of all annual licences. The exclusion of licence renewals, to my mind, would be a significant omission in the estimation of supply increments.

The availability of life tables (Table 5) for estimating losses due to death is beneficial in making the projections more specific and, hopefully, more precise. It is regrettable that labor force separation tables (Table 6) are not prepared for Canada as the inclusion of statistics derived from such tables would refine the data further. This study was not limited by the absence of this data, however, as the availability of age stratification of the nursing group gave a good measure of the likely loss due to retirements over the planning time frame.

The cohort and approximations methods (Tables 7 and 8) of estimating supply losses were not tested: the former by reason of non-availability of data; and the latter, and the former to a certain degree, because more refined data were available.

Trend analysis provides a quick estimate of the anticipated net changes to supply, but the underlying assumption that the historical trend will continue into the future may not remain valid during a lengthy planning time frame. More precise forecasts should be developed if possible.

Of the two methods used to project future requirements for nurses, only the Budgeted Job Vacancies Approach (Table 17) can be considered to give a reliable estimate. In point of fact, estimates derived from this approach must also be viewed with caution in most cases since budget projections often tend to be based more on wishful thinking than reality.

The use of a manpower/population ratio (Table 12) does not seem suitable for nursing personnel in this Province. Nurses are not independent practitioners, but rather are employed individuals, 88% of whom work in hospital and nursing home/home for special care settings (Table 20). This means that one of the major variables determining their requirements is the construction/expansion of health care facilities over the planning time frame. The Manpower/Population Ratio Approach takes no account of this or other important variables such as the effects of the changing pattern of health care delivery. Also, in addition to being biased in favor of the status quo, manpower/population ratios have the further disadvantage of masking inequities between the various geographical regions.

A point of note, also, is that neither of these two methods accounts for the development of innovative roles for nurses in the Province, such as those now being developed at Memorial University School of Nursing through its Masters program.

While three of the requirements approaches are not feasible for use in the Province, given the current method of financing health care (see Section 4.3.1 and Tables 14, 15 & 18), several of the other methods presented could be quite useful in local planning activities. Both the Health Needs and the Service Targets Approaches (Tables 10 & 11) are based on the sound logic that it is the health status of the population that ultimately determines the manpower requirements. However, the volume of work and the associated time, human, and fiscal resources needed to carry out the data collection and analyses for these approaches will prevent their use except in cases where provincial or national governments are prepared to provide the necessary financing, manpower, and computer hardware.

As with all approaches, however, these methods have significant drawbacks, the main two being that they are not based on the effective demand for care and that they assume no constraint to seeking care. While the latter may be true in most cases in Newfoundland in respect to there being no financial constraints to care, there may be social and personal barriers to an individual's seeking care. The fact that these approaches are not based on effective demand could lead to unrealistically high projections based on the fact that there may be a wide discrepancy between the level of health care that people need as determined by health

professionals and the level of health care that people themselves want and are willing to seek.

The requirements methods based on health demands are premised on the concept of effective demand for health care, but the assumptions underlying several of the variants, such as (1) that present utilization patterns will be suitable for the future, and (2) that factors other than demography and income will not change, may not represent reality.

Only two of these methods could have application in this Province if the appropriate data were available. The Royal Commission on Hospital and Nursing Home Costs is now developing a bank of utilization data that would serve as a good basis for manpower planning projections based on the Constant Utilization with Changing Population Variant (Table 13). It is unlikely that a suitable industry-occupational matrix (Table 16) will be available in the near future for, while Statistics Canada is currently developing a new national matrix, it will not be sufficiently stratified for the health industry to allow for application of it to the individual health professional groups.

The requirements method based on comprehensive, pre-paid group plans (Table 18) is not suitable for use in this Province for the reasons outlined in Section 4.3.1.

An attempt was made to compare the results of nurse manpower projections derived using structured manpower planning strategies, as per this thesis, with the projections derived by an expert committee using their expertise and professional judgements. The findings of the ARNN's Ad Hoc Committee on Nurse Manpower (ARNN, 1982), chaired by L. Croft, were utilized for this purpose.

The same approaches for estimating current supply and requirements were used in this thesis and the Nurse Manpower Report, both of which drew the same conclusions (taking into account the one-year time difference in reporting).

Major differences, however, were evident with respect to future projections. The effects of several variables were identified and quantified in the thesis, and two formal planning methods were used to assess both supply and requirements. Although several variables were identified in the Nurse Manpower Report, only a few were quantified and no formal projection techniques were used.

A comparison of the results are presented in Table 36. As is evidenced by the table, a much more detailed and precise estimate of future supply and requirements is made in the thesis than in the Nurse Manpower Report. Indeed, the report tended more to identify variables without quantifying them and did not give overall projections for the Province.

TABLE 36 - COMPARISON OF PROJECTED REQUIREMENTS
FOR NURSES BASED ON NURSE MANPOWER
REPORT AND THESIS IN PROGRESS

	<u>Nurse Manp. Report</u>		<u>Thesis</u>	
	<u>Utilized</u>	<u>Quantified</u>	<u>Utilized</u>	<u>Quantified</u>
<u>Future Requirements</u>				
Employer's perceived needs	Yes	190	Yes	215
Construction/Expansion (combined)	Yes	10-20 200-300	Yes	146
Turnover	Yes	No	No	-
Pattern of health care delivery	Yes	No	Yes	175
Population structure	Yes	No	Yes	Yes - 0
Industrial expansion/reduction	Yes	No	Yes	No
Budgeted Job Vacancies Approach	No	No	Yes	3148
Manpower/Population Ratio Approach	No	No	Yes	2886
<u>Projected Supply</u>				
New graduates	Yes	1661-1706	Yes	1394
Retention rate	No	-	Yes	98%
Geographic transfers in	Yes	750	Yes	735
Pregnancy/illness	Yes	No	No	-
Retirements	Yes	No	Yes	102
Deaths	Yes	No	Yes	26
Occupational transfers in	Yes	No	Yes	No
Occupational transfers out	Yes	No	Yes	No
Continuing education	Yes	No	Yes	No
Geographic transfers out	Yes	No	Yes	750
Other factors	Yes	No	Yes	No
Aggregate supply	No	No	Yes	5917 (3945FTE)
Trend analysis	No	No	Yes	5575 (3717FTE)

Note: Nurse Manpower Report Planning Time Frame: 1982-1986. Thesis Planning Time Frame: 1983-1987

Source: Association of Registered Nurses of Newfoundland. Nurse Manpower Report, June 1982

It would seem, based on all the evidence presented, that the formal planning strategies utilized in the thesis would be beneficial for nursing and other health manpower planning activities in this Province. As soon as the needed information and/or financing becomes available, efforts should be made to apply the other feasible requirements methods to the local nursing situation to assess their precision as predictive tools and to compare their usefulness with that of the two approaches used in this thesis (pp. 139-141). Following that analysis or concomitant with it, manpower planning activities using formal strategies should be undertaken in most of the other major health professional groups. Such efforts would, in all likelihood, provide for a more accurate assessment of current and future supply and requirements and significantly improve the data bases on which policy decisions are made.

It should be noted, however, that, given the facts that one is dealing with human resources and that numerous other factors (e.g., economic, legal, political, professional) can have a major impact on any plans that are made, the art of health manpower planning is and will remain very imprecise and hazard prone. Speaking on this subject, Thomas Boudreau (1971) said that it appears futile to try to forecast quantitatively the needs for each category of health

manpower given the fact that it is impossible to foresee all the technical and organizational innovations that will be implemented in the future or their effect on health manpower. He illustrates this point by referring to the possibility that a technological innovation designed to reduce the utilization of personnel may indeed result in an increase of personnel because of the new ability to offer better and additional services (p. 108-109).

Boudreau strengthens his arguments for the futility of precise forecasting by suggesting that the same health services can be rendered and the same objectives realized with many different combinations of resources and programs. This, he claims, permits adaptations to changes in the relative efficiency or scarcity of the resources including manpower. Based on these factors, Boudreau suggests that it would be meaningless to try to forecast exactly the number of persons who would be needed in each category of personnel in 5 or 10 years or to develop programs in order to produce exactly the number which has been forecasted. He suggests instead that, in light of these considerations, the basic ingredient of a manpower policy in a health industry ought to be flexibility aimed at encouraging horizontal and vertical mobility inside the health industry and with other sectors of the economy. This flexibility, he says, should also introduce possibilities and incentives for redefinition

of job contents as well as redistribution of tasks. Such flexibility, he feels, would enable the manpower structure to adapt itself easily and rapidly to structural, technical and economic changes (p.109).

The author agrees with Boudreau on the hazards of health manpower planning and the need for flexibility and an open mind when it comes to developing policies and programs designed to provide sufficient numbers of health care workers to meet the future requirements. Formal and informal manpower planning activities will still have to take place, however, particularly those aimed at establishing good manpower data bases.

Given the current economic situation and Newfoundland's position with respect to the supply level of most of the health professional groups, there is a great need for accurate and timely statistics on which to base policy decision-making regarding health educational and immigration matters. It is felt that the material presented in this thesis can serve as a suitable framework for developing appropriate data banks - data banks on which realistic health manpower plans can be based.

It is worth bearing in mind, however, that, as Nathan Associates, Inc. (USDHEW [HRA] 76-14511, 1976) suggests, "no mechanistic technique is a substitute for insight."

Therefore, the use of expert opinion and professional judgement should be incorporated with any mechanistic techniques that are to be utilized in all future manpower planning endeavours. This thesis has demonstrated as well the importance of selecting a planning approach that will identify variables separately as they are more likely to provide a more precise estimate.

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APPENDIX A

LISTING OF THE EMPLOYING AGENCIES INCLUDED
IN THE ANNUAL HEALTH AND SOCIAL
SERVICES MANPOWER SURVEY, BY CATEGORY

General Hospitals

1. General Hospital - Health Sciences Centre
2. St. Clare's Mercy Hospital
3. The Salvation Army Grace General Hospital
4. The Dr. Charles A. Janeway Child Health Centre
5. Waterford Hospital
6. Children's Rehabilitation Centre
7. Carbonear General Hospital
8. Brookfield Hospital
9. Fogo Hospital.
10. James Paton Memorial Hospital
11. Notre Dame Bay Memorial Hospital
12. Central Newfoundland Regional Hospital
13. Harbour Breton Hospital
14. Green Bay Health Care Centre
15. Baie Verte Peninsula Health Care Centre
16. A. M. Guy Memorial Hospital
17. Western Memorial Regional Hospital
18. Sir Thomas Roddick Hospital
19. Channel Hospital
20. Port Saunders Hospital
21. Captain William Jackman Memorial Hospital

22. Charles S. Curtis Memorial Hospital
23. Melville Hospital
24. Churchill Falls Hospital
25. North West River Hospital

Other

1. Public Health Nursing Division, Department of Health
2. Public Health Laboratories
3. St. John's Home Care Program
4. Department of Social Services
5. Grenfell Regional Health Services Nursing Stations/
Community Health Centres and Public Health Nursing
Division

Government Operated Hospitals

1. Dr. Walter Templeman Hospital
2. Markland Clinic
3. Placentia Cottage Hospital
4. Old Perlican Cottage Hospital
5. Come By Chance Cottage Hospital
6. St. Lawrence Cottage Hospital
7. Grand Bank Cottage Hospital
8. Burin Cottage Hospital
9. Bonavista Cottage Hospital
10. Botwood Cottage Hospital
11. Bonne Bay Cottage Hospital
12. Burgeo Cottage Hospital

Nursing Homes/Homes for Special Care

1. The Leonard A. Miller Centre
2. Escasoni Senior Citizens Complex
3. Children's Home
4. St. Patrick's Mercy Home
5. Exon House
6. Glenbrook Lodge
7. Hillview Lodge
8. Hoyles Home
9. Agnes Pratt Home
10. St. Luke's Home
11. Carbonear Interfaith Home
12. Harbour Lodge
13. Golden Heights Manor
14. Bon News Lodge
15. Blue Crest Interfaith Home
16. Lakeside Homes Limited
17. North Haven Manor
18. Carmelite House
19. Valley Vista Nursing Home
20. Corner Brook Interfaith Home
21. Bay St. George Senior Citizens Home
22. St. Anthony Interfaith Home
23. Paddon Memorial Home
24. Western Memorial Regional Hospital Extended Care Unit

APPENDIX B

DETAILED CALCULATIONS FOR TREND ANALYSIS OF ANNUAL SUPPLY.

Year	X	Y	X ²	XY
1976	-3	3347	9	-10,041
1977	-2	3554	4	- 7,108
1978	-1	3751	1	- 3,751
1979	0	3911	0	0
1980	+1	4087	1	+ 4,087
1981	+2	4228	4	+ 8,456
1982	+3	4371	9	+13,113
N=7	$\Sigma X=0$	$\Sigma Y=27,249$	$\Sigma X^2=28$	$\Sigma XY=4,756$

$$a = \frac{\Sigma Y}{N} = \frac{27,249}{7} = 3,892.7$$

$$b = \frac{\Sigma XY}{\Sigma X^2} = \frac{4,756}{28} = 169.9$$

The trend equation with 1979 as the year of origin is:

$$Y_c = a + bx = 3,892.7 + 169.9x$$

Projected supply to 1987 using this equation:

1983	4572.3
1984	4742.2
1985	4912.1
1986	5082.0
1987	5251.9

